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Publications

MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF AN APPLICATION BY CANADIAN
ARCTIC GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY
THAT MIGHT BE GRANTED ACROSS CROWN LANDS WITHIN
THE YUKON TERRITORY AND THE NORTHWEST TERRI-
TORIES FOR THE PURPOSE OF THE PROPOSED MACKENZIE
VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE
ABOVE PROPOSED PIPELINE

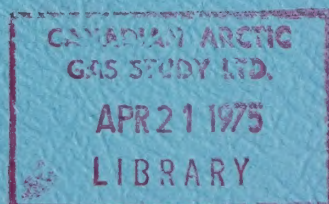
(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

April 16, 1975

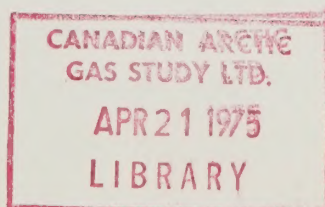
PROCEEDINGS AT INQUIRY

VOLUME XXXI



APPEARANCES:

Mr. Ian G. Scott, Q.C.	
Mr. Stephen T. Goudge,	
Mr. Alick Ryder and	
Mr. Ian Roland	for Mackenzie Valley Pipeline Inquiry;
Mr. Pierre Genest, Q.C.	
Mr. Jack Marshall,	
Mr. Darryl Carter and	
Mr. John Steeves	for Canadian Arctic Gas Pipeline Limited;
Mr. Reginald Gibbs, Q.C.	
Mr. Alan Hollingworth	for Foothills Pipelines Ltd.;
Mr. Russell Anthony, and	
Prof. Alastair Lucas	for Canadian Arctic Resources Committee;
Mr. Glen W. Bell and	
Mr. Gerry Sutton	For Northwest Territories Indian Brotherhood and Metis Association of the Northwest Territories;
Miss Lesley Lane	for Inuit Tapirisat of Canada and The Committee for Original Peoples' Entitlement;
Mr. Ron Veale and	
Mr. Allen Lueck,	for Council for Yukon Indians
Mr. Carson H. Templeton,	for Environmental Pro- tection Board;
Mr. David Reesor,	for Northwest Territories Association of Munici- palities;
Mr. Murray Sigler,	for Northwest Territories Chamber of Commerce.



I N D E X

Page

WITNESSES FOR APPLICANT:

Hoyt PURCELL
Graham George KING
Carl M. KOSKIMAKI
Milton E. HOLMBERG
John T. McMULLEN
Patrick St. John PRICE
Kenneth E. RATHJE
Cameron M. REID
- Cross-Examination by Mr. Gibbs (cont) 3873
- Cross-Examination by Mr. Anthony 3882

Yellowknife, N.W.T.

April 16, 1975

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. SCOTT: Mr. Commissioner,
should
in view of the requirement that you be in Vancouver
tomorrow, I thought it might be helpful to all parti-
cipants if I outlined the time table contemplated.

I propose that we should sit
today until one o'clock; that we should begin on
Friday at 9:30 and we should sit on Friday morning,
Friday afternoon and Saturday as may be required to
complete this panel, and to deal with the motion
with respect to the corridor phase. I hope it won't
be necessary to in fact sit all Friday, but we would
like to put aside that time just in case it is neces-
sary to do so to complete this panel.

Then we will propose to begin
the construction panel on Monday at one o'clock in
the afternoon.

MR. GIBBS: Mr. Commissioner,
yesterday in the course of trying to follow two
lines of questioning with Mr. Holmberg at the same
time and fend off my friend Mr. Marshall, I overlooked
dealing with the portion of the application entitled
"National Economic Effects of the Applicant's
Proposal", I wonder if I might have your indulgence
to reopen my cross-examination to do that at this
time?

HOYT PURCELL

GRAHAM GEORGE KING

CARL M. KOSKIMAKI

MILTON E. HOLMBERG

JOHN T. McMULLEN

PATRICK ST.J. PRICE

KENNETH E. RATHJE

CAMERON M. REID, Resumed:

CROSS-EXAMINATION BY MR. GIBBS, CONTINUED:

Q And could Mr. Purcell be equipped with Exhibit 54, and the volume entitled National Economic Effects of the Applicant's Proposal, Section 14.b? And perhaps, sir, that additional volume should be marked as an exhibit as I am going to refer to it, but I don't tender it as being my exhibit and being bound by its contents.

MR. GENEST: Well, Mr. Commissioner, following Mr. Scott's precedent, that in my submission, makes it a non-exhibit. This panel is not, as I understand it, has had nothing to do with the preparation of this exhibit. It is not proved in any way. I have stated my position, that I do not tender it at this stage as part of my case, and if Mr. Gibbs wants to file it, it seems to me he has to prove it in the usual way.

Now, I have stated on record that of course we stipulate and admit that that is a document prepared by Arctic Gas and filed before the

1 Energy Board, but it does not constitute a part of
2 our application to the Minister of Indian Affairs and
3 Northern Development, which has been referred to you.

4 MR. GIBBS: Well sir, obviously
5 it's impossible for me to prove the document. It
6 originates with my friend's client. It is a matter
7 of public record, being on file with the National
8 Energy Board. It seemed to me that it could be marked
9 as an exhibit in the sequence without anyone being
10 responsible for it. It's there, and presumably some-
11 one has authored it, and I'm certainly not going to
12 ask this panel about all of its contents, but just
13 refer to selected portions.

14 MR. SCOTT: Mr. Commissioner,
15 I would have thought respectfully, that Mr. Genest,
16 I thought this was the point of the compromise some
17 weeks ago, that Mr. Genest having admitted that it
18 was prepared by Arctic Gas and they were responsible
19 for it, that that was in fact sufficient to treat it
20 as proved before this inquiry.

21 Whether the panel is able to
22 answer any questions on it, is indeed a second subject,
23 unrelated, but I would have thought that the document
24 could, in view of Mr. Genest's admission, be marked
25 as an exhibit.

26 THE COMMISSIONER: Well I think
27 that there is no difficulty in proving this document.
28 It is what it purports to be, a volume submitted to
29 the National Energy Board by Arctic Gas, and presumably
30 if we were to read it, it would become apparent to

1 the extent to which it can be used, so to speak,
2 against Arctic Gas. But I don't propose to have it
3 marked as an exhibit now, because there may well be
4 questions arise relating to the relevancy of what
5 it contains. I think that I will allow Mr. Gibbs to
6 proceed with his questions, and if in fact it appears
7 that some of the assertions contained in this document
8 are relevant to this inquiry, then it will at that
9 stage be marked.

10
11
12 MR. GIBBS:

13 Q Mr. Purcell, would you
14 look please at Exhibit 54? Section 8.b, tab 1,
15 that's 1 on the pink label, also tab 1 on the white
16 label, and then the second page which is entitled
17 Table 2, "Projected Annual Gas Volumes"?
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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Gibbs

1
2 WITNESS PURCELL: I have
3 that page, Mr. Gibbs.

4 Q I ask you sir, if in
5 looking at table 2, to come down the left-hand column
6 to the last entry under the heavy printing:

7 "Richards Island to Travaillant Lake"
8 which is a lighter printing saying:

9 "Total delivery to Travaillant Lake."
10 I'm sorry, the line before that saying:

11 "Travaillant Lake Delivery."
12 Do you have that?

13 A Yes.

14 Q And that, sir, that
15 series of numbers represents the volumes that you
16 were told would be delivered from Richards Island and
17 downstream of Richards Island to Travaillant Lake.

18 A Mr. Gibbs, are you
19 speaking about the Travaillant Lake delivery line, is
20 that right?

21 Q Yes.

22 A That is correct.

23 Q And the expression,
24 "Richards Island and downstream of Richards
25 Island,"

26 is equivalent to what we've been talking about as
27 Mackenzie Delta gas, or Beaufort Basin gas.

28 A Yes sir.

29 Q Yes, and if you add up
30 those numbers under "Travaillant Lake Delivery" across

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Gibbs

1
2 that page you come to 3 trillion 212 billion cubic feet.

3 A I'll take your word for
4 it, I haven't added them up.

5 Q Well, do we assume that
6 that's the right number, or do you want to add them up?

7 MR. GENEST: Did you add them
8 up, Mr. Gibbs? If you say it's right we'll accept that.

9 MR. GIBBS: All right, I say
10 it's right, so you accept it, sir.

11 Q Now, sir, the design
12 which you have presented --

13 THE COMMISSIONER: Excuse me,
14 Mr. Gibbs, forgive me. What was it you just added up?
15 I was with you at 821.8 million cubic feet.

16 MR. GIBBS: Well, sir, if you
17 take that line headed:

18 "Travaillant Lake Delivery"

19 it starts at 230,000,000,000 cubic feet in the first
20 year of 1978, and then 456.6 billion cubic feet in the
21 year 1979, if you add all of those across that line it
22 comes to 3,212,000,000,000 cubic feet.

23 THE COMMISSIONER: Three
24 trillion 212 billion?

25 MR. GIBBS: 3.212 trillion
26 cubic feet. In billions of cubic feet, 3212 billion
27 cubic feet.

28 Q That's correct, Mr.
29 Purcell?

30 A I haven't added it up,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Gibbs

1
2 Mr. Gibbs.

3 Q No, but you accept my
4 numbers?

5 A I accept your numbers.

6 Q And, sir, that would be
7 the total of all gas delivered in those six years from
8 the delta to the Travaillant Lake junction point.

9 A Yes sir.

10 Q And if one took the
11 capacities in the design of this system in which you
12 had some input, it is, sir, an inevitable conclusion,
13 is it not, that all of that gas will go into U.S.
14 markets?

15 A No sir.

16 Q Well, if you take your
17 42-inch lines running from Caroline firstly south to
18 Kingsgate and the other one south-east to Mouncie, and
19 you operate those at their capacity, doesn't all of the
20 gas that comes in at the north go out across the 49th
21 Parallel?

22 A The gas volumes that are
23 presented in this table are shown for the most part
24 to be delivered south of the 49th Parallel. There is
25 a delivery to Alberta Natural Gas.

26 Q And that goes --

27 A I think it would be
28 helpful, Mr. Gibbs, if we referred to the second
29 paragraph in the introduction to this section. It
30 speaks to the assumptions that were made with regard

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Gibbs

1
2 to the delivery of gas. This is the applicant's
3 statement, and I have no reason to not support it.

4 Q But thinking of the
5 design to start with, Mr. Purcell, if those two 42-
6 inch lines south of Caroline are to operate at
7 capacity, all of the gas coming in at Travaillant Lake
8 including that 3.2 trillion cubic feet will go out
9 across the 49th Parallel.

10 MR. GENEST: Mr. Commissioner,
11 I must object to that question. In my submission this
12 Inquiry is not concerned with what happens to the
13 gas after it gets below south of 60. This Inquiry
14 is concerned with the impact of the construction of a
15 pipeline in the north, and we could go on for days. I
16 could call reply evidence to this sort of line of
17 questioning --

18 THE COMMISSIONER: Excuse me,
19 Mr. Genest, I'd like to know too the relevance of this,
20 Mr. Gibbs.
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1 MR. GIBBS: Well sir, in my
2 submission it's just not possible to erect a curtain
3 at the 60th parallel. This hearing, as I understand
4 it, is to assess the economic impact of the project
5 on the north, and as well, so that northerners will
6 know what this project is all about.

7 My friend is true that when we
8 get to the National Energy Board, this sort of thing
9 will be canvassed in much more detail, but sir,
10 whether or not any of that canvassing will reach the
11 people of the north in my submission is doubtful.

12 I'm not going to question these
13 witnesses a great deal on Canadian supply and require-
14 ments, but they are the ones who designed the system,
15 and they are the ones who can say, as a matter of
16 logic flowing from the design, that's where the gas
17 will go. And sir, it may well be that when it comes
18 time for you to attach/^{or}to recommend conditions to the
19 use of Territorial land, you may want to take into
20 account, what the ultimate use of that land is.

21 THE COMMISSIONER: I do not
22 altogether follow you, Mr. Gibbs. If you are frank
23 to concede that you are now exploring with Mr.
24 Purcell the question of the ultimate destination of
25 the gas that will flow through this trunk pipeline,
26 let us suppose that this witness were to admit that
27 it was all going to go to the United States -- I
28 take it that was the proposition you put to him?
29 That is all of the delta gas was going to go to the
30 United States. How does that fact bear on the

1 terms of reference of this inquiry? That is what
2 concerns me. We might all of us in this room be very
3 interested in knowing the answer to that question,
4 yet this inquiry is established by the Government of
5 Canada to investigate certain matters, and one of
6 those matters, export of -- excuse me, and Parliament
7 has established another tribunal, a National Energy
8 Board, to investigate certain other matters. And
9 export of gas per se, export of gas in itself certainly
10 is for the National Energy Board and not for this
11 inquiry.

12 MR. GIBBS: Quite sir, I don't
13 dispute that, but one can't sever the jurisdiction,
14 if one wants to use that word, of this inquiry from
15 that of the National Energy Board. There has to be
16 an overlapping because of the similar subject, and
17 if I can show, which I believe I can from these docu-
18 ments, that according to the applicant's own numbers,
19 the gas from the delta is not required in Canadian
20 markets until 1984, that, it seems to me, may well
21 leave you in your deliberations to conclude that the
22 Canadian part of this project required for Canadian
23 service and Canadian markets is premature.

24 On the applicant's own numbers.

25 THE COMMISSIONER: Well, it
26 seems to me that the question whether Canada is in
27 need of gas from its Arctic frontier is not one for
28 this inquiry, and I think that it would be beyond
29 the terms of reference of this inquiry to seek to
30 go into that, and I'm afraid I'm against you. You've

1 been frank to put the proposition squarely to the
2 inquiry, and I must say that this is the wrong inquiry.

3 MR. GIBBS: All right, sir.

4 THE COMMISSIONER: Maybe the
5 right inquiry, but it's the wrong inquiry as far as
6 you're concerned.

7 MR. GIBBS: Then I have no further
8 questions.

9
10 CROSS-EXAMINATION BY MR. ANTHONY:

11
12 Q Mr. Commissioner. Mr.
13 Purcell, I wonder if we may start off this morning,
14 if I could get some indication of the area of
15 responsibility for the design panel and in particular,
16 I refer to page 10 of your statement of testimony
17 where you state that you were not responsible for the
18 design of the waste disposal facilities and so on.
19 Could you tell me who was responsible for that design
20 component?

21 WITNESS PURCELL:

22 A That work was done under
23 sub-contract to N.E.S., and the sub-contractor we
24 reported to another department. He reported to Mr.
25 Frank MacLean in the Civil Engineering Department.

26 Q Do you know who headed up
27 that study within N.E.S.?

28 A In N.E.S.?

29 Q Yes?

30 A Mr. Frank MacLean was the

1 man to whom the consultant reported.

2 Q Well I raised this point
3 with my friend Mr. Genest earlier, and I'm wondering
4 just so that others could be informed as well as I,
5 when this -- whether this evidence is intended to be
6 called, and whether it's to be part of a subsequent
7 phase in the hearing.

8 MR. GENEST: Mr. Commissioner,
9 we had planned to call this evidence as part of phase
10 2. It seemed to us at least recognizing the overlap
11 between the phases and the difficulty of drawing a
12 strict line, that measures such as those described by
13 my friend, Mr. Anthony, were really concerned with the
14 impact of this project on the physical environment,
15 and the design features and so on, it's very hard
16 to separate them, would be better treated of a piece
17 in phase 2, and that's where we intend to call and
18 lead evidence of that kind.

19 I can assure my friend that evi-
20 dence will of course be led.

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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

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2 MR. ANTHONY: Certainly that's
3 fine. I just wanted to get that point clear. The fur-
4 ther point I'd be interested in dealing not only with
5 the impact on the physical environment, which of course
6 is clearly in Phase 2, but also the size of the sewage
7 lagoons, the construction techniques to be employed,
8 the amount of evaporation, the effect on the permafrost
9 below the lagoon, and these questions. Would the
10 evidence you anticipate calling in Phase 2 deal with
11 what I call the engineering aspects of waste disposal
12 as well as the impact?

13 MR. GENEST: Well, I would
14 think it would have to, Mr. Commissioner.

15 MR. ANTHONY: Q Mr. Purcell,
16 does the design group that you represent here, do
17 they report directly to Arctic Gas, or to Northern
18 Engineering Services?

19 WITNESS PURCELL: Northern
20 Engineering Services.

21 Q Now, when the design
22 group that you head completes its initial design, which
23 is part of the application, do you have a continuing
24 function within Northern Engineering Services?

25 A Our first function is
26 to -- and the function that's covered by our contract
27 with Canadian Arctic Gas, is to support the application,
28 the aspects of the application that we have prepared,
29 before bodies such as this.

30 Q Are you involved in a

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 continuing system of design review?

3 A The final design of the
4 pipeline is proceeding now.

5 Q But if, as construction
6 proceeds in the pipeline -- should construction proceed
7 -- and you encounter field conditions which perhaps
8 vary the models and hypotheses which you have included
9 in your field design, are you able to review those
10 designs and alter specifications and so on?

11 A Yes, I think so.

12 Q So you would expect then
13 that the area which I call design review would be
14 within your purvue as a continuing operation within
15 Northern Engineering Services.

16 A Yes.

17 Q I believe in answer to a
18 question yesterday that you indicated that there is a
19 lead time of approximately a year between the ordering
20 of pipe, for example you're using, and the actual
21 ability for the manufacturer to supply that pipe to
22 that specification. Is that accurate?

23 A That's a comfortable
24 cost estimate for the amount of time that would be
25 desirable.

26 Q Perhaps you could assist
27 me by indicating how this design review function is
28 performed, if I may use an example, you find that in
29 the field conditions in your first construction year
30 the pipe is not reacting as you expected, or that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 there is a greater strain than you expected, and this
3 information becomes known to you towards the end of
4 the first construction year, how does the design review
5 process operate and what would you anticipate would
6 be the ability to react to these field conditions?

7 A I don't think we'd find
8 out anything after the first construction year because
9 the pipe would not be put into operation. I think any
10 problems that developed then would be what we call
11 geotechnical problems. I can't see where this group
12 of people would be affected by what happens in the
13 first construction year. I can't think of an example.

14 Q Of course, by the time
15 the pipeline is actually in operation it's a little late
16 to vary specifications, is it not?

17 A There could be minor
18 variations in operating procedures that a person could
19 use to overcome a problem that had occurred.

20 Q So am I accurate then in
21 saying that as far as the design specifications are
22 concerned, once the pipeline is in operation it's too
23 late to change it?

24 A We can't change a
25 specification for any purpose after the pipeline is
26 in operation, "specification" meaning a detailed
27 description of the components of the pipeline system
28 that are prepared in order to buy the material.

29 Q Now I believe evidence
30 of Mr. Dau at an earlier stage indicated that the

Purcell, King, Koskimak i, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 location of compressor stations, each station was
3 dependent on the location of those around it, and that
4 for an optimum location, if you want to move one station
5 beyond the 4-mile limit, you would have to make alter-
6 ations in the location of the station upstream and the
7 station downstream. Is that accurate?

8 A Generally yes, the move-
9 ment of one station would affect the requirements on
10 the adjacent stations.

11 Q So therefore, if I may
12 strike another example, if you have this location
13 set of a compressor station at location A, and location
14 C, and then you go to construct the compressor station
15 between those two, you run into an unexpected con-
16 dition you're unable to change that location, are you?

17 A My understanding, Mr.
18 Anthony, is this, again it would be a foundation
19 problem is the only problem I can think of encountering.
20 My understanding is that the geotechnical group has
21 designs for any type of soil condition they could
22 encounter. They have locations where they would
23 prefer to build, but they can accommodate any type of
24 soil, within reason.

25 Q So that in the two
26 examples that I have discussed, the answer is a geo-
27 technical answer to deal with the problem rather than
28 design answer to make any change in the design itself.

29 A I think because of the
30 scheduling of construction it would not be practical to

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 try to move a compressor station at the last minute.
3 The pad has to be built before pipeline construction.
4 That's its earliest use.

5 Q So the answer really is
6 a remedial geotechnical one rather than a design review
7 one.

8 A Remedial in the sense
9 that the geotechnical people have to, as they have
10 discussed with you, have to adapt their designs, modify
11 them slightly if they encounter unexpected condi-
12 tions. They say they are confident they can do that.

13 Q But there is nothing
14 you can do as -- in designing facilities to change
15 the pipe, to change the compressor location, or deal
16 with issues as a design review problem.

17 A We can't change the pipe
18 after it's been constructed. I don't think it's feasible
19 to change the location of major facilities.
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Holmberg, Burcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Anthony

1 Q Mr. Purcell, in your evi-
2 dence at page 37, you state halfway through the first
3 paragraph there,

4 "For the special conditions
5 applicable to the project including stability
6 at field bends and frost heave",
7 you've developed modifications to the recognized
8 computer program to analyze stresses and deformations
9 on buried line and interaction between the buried
10 pipe and the frozen and unfrozen soils using modern
11 analytical methods.

12 Would you describe what these
13 special problems associated with field bends are?

14 A It was described briefly
15 yesterday by Dr. Price. Were you here for his
16 presentation?

17 Q Yes, I was.

18 A Are there questions beyond
19 what he presented?

20 Q Well perhaps. As I under-
21 stand it, he dealt with the question of the ability
22 of the pipe to flex or bend in the corner and the
23 difference in strain that that would cause. Is that
24 generally accurate?

25 A His concern is not allow-
26 ing the pipe to move too much at bends, so that it
27 would damage the integrity of the pipe.

28 Q Am I right in saying that
29 the bending of the pipe is done at the field?

30 A The field bends are made

1 generally by a bending machine during construction,
2 yes.

3 THE COMMISSIONER: That is a bend
4 within a length of manufactured pipe?

5 A That's correct, it's an
6 abrupt bend. The pipe is stretched.

7 Q And this would be approp-
8 riate at river crossings where you may be going down
9 a mild or gradual slope, that kind of thing?

10 A Yes sir, the bends will be
11 very frequent in this pipeline because it is so stiff.
12 Any time the pipe makes a change in alignment, there
13 would have to be a bend put in the pipe. Any time it
14 passes over the top of a hill, there would have to be
15 a bend.

16 Q You said because it is so
17 what? Did you say stiff?

18 A Stiff, it's rigid, it's
19 difficult, it doesn't bend under its own weight, it's
20 not flexible. Like a smaller pipe. The bigger a
21 pipe generally, the more bends have to be put in in
22 the field, so that the pipe fits the ditch.

23 MR. ANTHONY:

24 Q Just so I may be clear,
25 would you describe the process involved in bending a
26 pipe?

27 A I can do it generally. I
28 think the next panel might be more expert at it.

29 Q Well perhaps we could defer
30 the detailed explanation, but -- and I'll deal with

1 it as a design question then. I gather from the evi-
2 dence, and again Dr. Price's evidence yesterday, that
3 you are limited in the amount of bend that
4 the pipe will accept without challenging its integrity.
5 Is that accurate? Perhaps Dr. Price?

6 WITNESS PRICE:

7 A The field bending operation
8 is done on a bending machine and they insert a
9 mandril in the pipe so you can bend it a great deal
10 more, the pipe without that mandril. This is to pre-
11 vent the wrinkle forming. However, when the pipe is
12 put into service, additional bending due to the
13 temperature differential or gas pressure changes,
14 makes a change of curvature, an additional change of
15 curvature in the pipe, and that is the one we guard
16 against to prevent wrinkling.

17 Q Could you perhaps enlighten
18 me in the maximum acceptable degree that the pipe can
19 be bent without endangering its integrity?

20 A Bent in a bending machine,
21 sir?

22 Q Yes, in the bending machine.

23 A The code of practice per-
24 mits a one and a half degree bend per diameter, that
25 is -- that's the limitation, that's what we bend
26 to.

27 Q Perhaps if I could put it
28 into terms that I might understand a little more
29 easily, if you, as you built the line, encountered a
30 problem which required the pipe to be relocated a mile

1 off the proposed alignment. You would have to make a
2 detour of a mile at a particular point; how far in
3 advance would you require this knowledge, in order
4 that you can accommodate the bend that would be
5 required around that point?

6 WITNESS PURCELL:

7 A The bend is made after
8 the ditch is opened, so there would be no problem
9 in accommodating the change in route.

10 Q Well I assume that if you
11 were -- if you had your pipe in the trench and you
12 were 150 yards away from an archaeological site that
13 you wanted to get around, you would probably say the
14 pipe couldn't bend sharp enough to get around that
15 location. Would that be accurate?

16 A It would -- I would think
17 if you were ditching with the ditching machine and ran
18 into an archaeological site, you would have to come
19 back some distance in order to be able to reroute the
20 pipeline around that site.

21 Q From a design criteria
22 point of view, if you wanted to move a line a mile,
23 how far back would you have to start the rerouting
24 process?

25 A You can have practically
26 square corners. We try to avoid that. I don't think
27 the question of route is very appropriate to us.

28 Q Well no I am dealing with
29 it purely as a design problem, and I'm putting it on
30 the basis that if you were told to reroute, given the

1 stress problems and the pipe's ability to bend and
2 other design criteria, how far in advance would you
3 require this information to maintain the optimum
4 design operation of the pipeline?

5 A From the standpoint of
6 stresses, I don't think we would be interested.

7 Q Any other standpoint that
8 would -- if they told you to make a 90 degree turn,
9 would you find that acceptable and accommodate that
10 in the design?

11 A It could be made over a
12 wide enough radius, yes.

13 Q And how wide would you
14 need a radius in order to accommodate a 90 degree
15 turn, then?

16 A Well you would need about
17 400 feet of pipe, I should think to accommodate that
18 kind of turn.

19 Q Now, applying the formula
20 that Dr. Price gave us earlier, how you say that as
21 long as it's 400 feet before you have to make the
22 turn, you can accommodate a 90 degree turn, is that
23 accurate?

24 A No, the total length of the
25 pipe that would go around that curve would be about
26 400 feet.

27 Q And I imagine that by
28 applying the formula, we can get an idea of exact
29 distances that are required then, is that accurate?

30 A Yes, it could be worked

1 out.

2 Q Would I be accurate in
3 suggesting that the field bend locations would be
4 areas of most likely failure, if there was to be a
5 failure in the pipe?

6 Dr. Price?

7 A Mr. Holmberg says that
8 that has not been his experience.

9 Q The fact that there is a
10 bend in the pipe, even of what we will call a maximum
11 bend acceptable to you, would not result in any parti-
12 cular sensitivity at that area, is that your evidence?

13 A That's correct, yes, sir.

14 Q I understand that at
15 river crossings you propose to use a thicker pipe
16 than in the general route, is that correct?

17 A That's correct.

18 Q Would you tell me why you
19 are using a thicker pipe at river crossings?

20 A One reason is that the
21 heavier pipe helps overcome the flotation problem.
22 Another reason would be to withstand the stresses that
23 might be imposed during the construction operation.

24 Another reason, it may not be
25 as applicable here as it is traditionally, is that
26 the forces on a pipe in a river crossing are apt to be
27 more variable. They're apt to be more difficult to
28 predict, so the designer applies a higher degree of
29 strength in the pipe.

30 I think in the present case

1 we are doing more detailed work on river crossings
2 than is normally done, more detailed engineering
3 work.

4 Q The second example you
5 gave me of the construction differences involved in
6 a river crossing, I expect that what you mean is
7 because you have to bend it to accommodate slope and
8 so on, a thicker pipe is required?

9 A The -- excuse me, the
10 river crossing pipe is weighted and for many rivers
11 as it's carried into the ditch with tractors, it has
12 fairly high stresses.

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Purcell, King, Koskimaki, Holmberg
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Q Are these not the same
types of stresses that you encounter if you are required
to bend the pipe at a very sharp degree?

A Well, a stress is a stress,

Q I would agree with that,
but --

MR. GENEST: Sounds like
Gertrude Stein.

MR. ANTHONY: -- I'm just
wondering what --

THE COMMISSIONER: Gertrude
Strain?

MR. ANTHONY: That's right.
I'm wondering why does a design matter if you feel
that it's inappropriate to use any different thickness
of pipe in an area where you will be encountering
sharp turns, for example, which will require con-
struction activity in site with the bending machine
and so on, but you feel it is essential when you are
doing the same operation at a railroad crossing?

A It's conventional practice
to use the same type of pipe in bends as it is on
the rest of the pipeline. It's also conventional
practice to use heavier wall pipe in river crossings.

Q Have you incorporated
into your design any special monitoring features at
river crossings?

A NO sir, the behaviour
of the pipe after it's constructed, I think, was

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 addressed by Dr. Clark and his panel. We've worked
3 with him a little bit in that area of investigation
4 but we have nothing to add to it.

5 Q As far as river crossings
6 are concerned, you recognized the increased strain on
7 the pipe and your answer is to put a thicker pipe at
8 those locations. Are you doing anything else from
9 a design point of view, different to accommodate the
10 particular circumstances at river crossings?

11 A I think not, sir. Not
12 within the responsibilities of this group.

13 Q In the test facilities
14 that were designed and operated by Arctic Gas were
15 there any bends in the pipes that were tested?

16 A I'm not sure, I think
17 the bends were prefabricated. I don't think there
18 were field bends at the test facility.

19 Q And you on page 25 of
20 your evidence talk about fittings, and you describe
21 what that is. Were there any fittings tested in the
22 test facilities?

23 A Those would be the
24 prefabricated bends that I spoke of. One would be what
25 is called an elbow, a 90-degree turn. Those were used,
26 I think, in the test facility.

27 Q Do you have any evidence
28 that you could refer us to that would enlighten us on
29 the question of whether or not your design response
30 of a thicker pipe will adequately protect the pipe in

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 these river crossing situations?

3 WITNESS PRICE: Could you
4 repeat that question, please?

5 Q Well, I understand
6 from a design point of view, your response to parti-
7 cular problems at river crossings -- high construction
8 activity, bending of the pipe, and so on -- is to use
9 a thicker pipe. I'm wondering if this has been tested
10 and if you can refer us to any test?

11 A I am still
12 not quite clear what you're getting at there.

13 Q Are you satis-
14 fied that by using a thicker pipe you're able to
15 adequately protect the pipe at these river crossing
16 situations? I gather you are because that's the only
17 technique you're going to employ. I'm wondering what
18 studies you can refer us to that you used to come to
19 this conclusion.

20 A Well, sir, the thicker
21 wall is appropriate for a construction operation,
22 in putting the pipe in, and a thicker wall certainly
23 would be able to withstand greater bending before
24 local wrinkling occurred. This is the condition we
25 are guarding against. We don't know or don't have
26 any studies on the comparative degrees of safety
27 between a thicker or thinner wall pipe at the
28 crossings there.

29 Q Sir, I missed the last
30 part of your answer.

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McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

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A We don't have comparative studies on the differences in the strength of a thicker or thinner wall at crossings, however.

Q Thank you. On page 26 of the evidence you refer to in the paragraph No. 2 about half-way down the page:

"We have established maximum allowable curvature changes in the pipe."

I would anticipate that this was the design criteria that the geotechnical people referred to, that they said they received from the design group; is that correct?

WITNESS PURCELL: Yes sir.

Q And the geotechnical panel translated that calculation for us in terms of differential heave, and advised us that the acceptable differential heave was from 2 to 4 feet. Is that -- would you agree with that?

WITNESS PRICE: That would be an acceptable range, sir. However, yesterday I tried to point out that the sensitive variable or condition in the pipe is a change of curvature. The absolute movement of the pipe is very dependent on geometry and the lengths over which they occur. We can't really base design on a differential movement. Those are just a range of values which they gave you to get some idea of the significance of a change in curvature.

Q Well, I wonder if you

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by 'Anthony

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2 could do the same sort of translation for us, and
3 advise in operating conditions, operating temperature
4 and pressures, what would be the acceptable level of
5 differential heave beyond which the integrity of the
6 pipe itself would be threatened?

7 A Beyond which the integrity
8 would be impaired, you say?

9 Strain, it would be
10 Q Beyond the maximum allow-
11 able curvature change that you referred to.

12 A Yesterday I showed you
13 a picture of a test that had been taken at the University
14 of California, and the deflection was a number about
15 20 times greater than that at which we would permit the
16 pipe to operate. Does that answer your question?

17 Q Well, only if your evidence
18 is that in this pipeline a deflection of 20 times greater
19 would be acceptable.

20 A No sir, it would not.

21 Q Well, what is the
22 acceptable level?

23 A The acceptable level would
24 depend on the curvature to which the pipe is bent. We
25 cannot give you a design, a fixed design movement.
26 We have to relate it to this curvature change. That
27 is the sensitive condition which governs buckling.

28 WITNESS PURCELL: The
29 examples that were given by the geotechnical panel
30 included the temperature differential and the pressure
considerations. They were all folded into that

Purcell, King, Koskimaki, Holmberg
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example.

Q Mr. Purcell, are you familiar with the concept of fatigue loading?

A I am generally. I think Mr. Holmberg is probably more familiar with it.

Q I wonder if Mr. Holmberg would mind just explaining that concept in simple terms?

13 WITNESS HOLMBERG: If you
14 stress a piece of steel or other materials, metals,
15 putting it into tension and compression, bending it
16 back and forth, even though you do this within the
17 elastic limit and the stresses are high enough, and
18 the number of cycles of bending are high enough, you
19 will develop cracks and these are called fatigue
20 cracks. Now it's known that if you bend within --
21 keep the stresses down below a certain level, you
22 can make an indefinite number of cycles, and will not
23 develop fatigue cracks.

24 Q Well, without getting
25 into these other criteria which may or may not
26 exist, I'm not competent to enquire into it, to put
27 it in terms of the pipeline, do I understand
28 fatigue loading would be a concept you're describing
29 in a situation where for example the pipe started
30 to rise, a berm was placed on it or some other
31 remedial measures, and the pipe was then put back
32 to its original position, and then for some reason
33 it started to rise again, at all times within its

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elastic limit.

A Yes, this would be an
example of fatigue, but the cycles that I mentioned
requires millions of cycles to develop cracks, in
many cases.

1 Q Am I right also that
2 fatigue loading may result from changes in operating
3 conditions of the pipeline? Changes in gas pressure,
4 temperature --

5 A Yes, that will result in
6 fatigue, but the experience has been and data shows,
7 that the cyclic stresses to which you develop due
8 to changes in pressure are so low that this does not
9 result in fatigue failures in service .

10 Q Does -- is fatigue load
11 also a possibility with respect to the change from
12 the non-operating condition of the pipe to the full
13 operating condition of the pipe?

14 A Yes, in fact this is the
15 condition in which you develop the highest stresses,
16 and if you'd have the sufficient number of cycles,
17 this is the condition under which you would be most
18 likely to develop a fatigue crack.

19 However again, this gets
20 up into thousands of cycles, hundreds of cycles,
21 thousands of cycles before you develop these cracks.

22 Q Do I understand the sub-
23 stance of your evidence that fatigue loading is not
24 a problem in the pipeline situation we have described?

25 A That is correct.

26 Q To go on, if I may. I'll
27 deal with the question of corrosion, and I will
28 direct these to Mr. Purcell and perhaps he may wish
29 to direct them to others.

30 As I understand your evidence,

1 the external corrosion problem will be dealt with by
2 conventional external coating. I think that's the
3 phrase you used on page 31, 32 of your evidence?

4 Mr. Purcell, have you had any
5 actual field experience with these conventional
6 external coating and Arctic conditions?

7 WITNESS RATHJE:

8 A In actual Arctic conditions,
9 we did run tests at very low temperatures to try and
10 simulate what would happen to these coatings when
11 subjected to various tests at low temperatures.

12 Q I understand that these
13 were laboratory tests and done at low temperature, is
14 that accurate?

15 A That's correct. There were
16 at the various test sites the pipe that was installed
17 did have coatings applied, but these test sites have
18 not -- the pipe has not been dug up and the coating
19 has not been inspected, at this time.

20 Q So at this stage you have
21 no field data evidence to explain the effectiveness
22 of this corroding in actual field study? Is that
23 what you're saying? That the pipe hasn't been dug
24 up yet and you don't know how effective the corrosion
25 techniques are?

26 A Well the corrosion tech-
27 niques as far as coatings go, do not differ from
28 conventional coating practices elsewhere in the
29 world, other than the fact that we're looking at
30 lower temperatures, and as a result of this the

1 corrosion expected will be much less.

2 Q Now in the description
3 of the Sans Sault facility, we had an explanation of
4 an above ground pipe, which apparently was coated or
5 painted in some way with the resulting -- resulting
6 in this cover cracking and peeling. Are you familiar
7 with that and what happened there?

8 A Yes, I was not there at
9 the time, but I have had this described to me by
10 people who were, and the coating did crack and fail
11 as a result of the low temperatures that it was
12 exposed to.

13 Now, it is our plan not to use
14 any coating that would be subjected to failure under
15 low temperatures.

16 Q The coating that you used
17 was a conventional external coating though, was it
18 not?

19 A Yes, for southern pipelines,
20 although for this size, 48 inch size, that particular
21 coating would not be a conventional coating.

22 Q You're saying that there
23 are -- that the coating you propose to use is a
24 different conventional coating, and you're satisfied
25 from your tests that it will not have the same experi-
26 ence as the one tried at Sans Sault?

27 A That's right.

28 Q But you haven't tested
29 that itself?

30 A Not on an actual buried

1 pipeline in permafrost. We have not tested coatings
2 that we have proposed to use north of the 60th
3 parallel.

4 Q Well I expect the one you
5 did test you intended to use and found it unacceptable?

6 A No. Since my involvement
7 we have not ever considered that particular coating.

8 Q Sorry, since your involve-
9 ment, but I'm concerned with the design criteria
10 that were given with respect to external coating,
11 and there was one tried and it failed?

12 A Yes, that's correct, but
13 I believe that the coatings that were put on at the
14 various test sites, were put on not necessarily to
15 test the coatings themselves. They were put on as
16 standard practice, which has always been done with
17 any buried pipeline.

18 Q So at least to that extent,
19 that sort of conventional external coating is not
20 acceptable?

21 A That's correct.

22 Q With respect to internal
23 corrosion, your evidence as I understand it, is it is
24 to be controlled by the limiting of the water content
25 of the gas. Now, in the pre-operating conditions
26 though, and I direct your attention to that situation,
27 is it intended to include the chemical coating and
28 interior of the pipe during storage and transportat-
29 ion?
30

1 WITNESS PURCELL:

2 A Yes.

3 Q Can you tell me what chemical
4 will be used?

5 WITNESS RATHJE:

6 A It's a -- well there are
7 two different types that we are considering, both of
8 which have been used for this purpose. I can dig
9 out the exact chemical names, if this is what you
10 want.

11 Q Perhaps you could and
12 provide it to us at a later date.

13 MR. GENEST: Well if the witness
14 indicates he has them, can you do it now?

15 WITNESS RATHJE: I think so, yes.
16 It would take me a few minutes, but --

17 MR. ANTHONY: Perhaps while he
18 is getting that information I could move on to Mr.
19 Purcell and find out, is it the intention that the
20 pipe be scrubbed out prior to the testing and
21 installation?

22 WITNESS PURCELL:

23 A It's normal practice to
24 run one of Mr. Reid's pigs through the pipe to remove
25 any debris that's in it before testing.

26 Q Perhaps while Mr. Rathje
27 is looking up that question, perhaps he could advise
28 us also of what cleaning agents will be used in that
29 process?

30 A Normally none. We're

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Anthony

1 not contemplating using any cleaning agents.

2 Q Is it just done by water
3 or just purely mechanical?

4 A It's purely mechanical.

5 Q With respect to the auto-
6 matic welding machines, could you tell me whether
7 there are any chemicals associated with the use of
8 that process?

9 A Could you repeat the
10 question?

11 WITNESS HOLMBERG: I'm sorry,
12 I wasn't paying attention.

13 Q With respect to the auto-
14 matic welding procedure, could you tell me which
15 chemicals are associated with that procedure?
16 Do you use any chemicals to clean the welding point,
17 do you use any chemicals in the actual --

18 A Oh to clean the surface
19 of the pipe that's going to be welded?

20 Q Yes.

21 A No. Just prior to welding
22 as far as the automatic welding machine is concerned.
23 A bevel is cut and you're welding on freshly machined
24 surface, a clean surface.

25 Q Do I understand then as
26 far as the corrosion coating which Mr. Rathje is going
27 to advise us on, it's removed mechanically and there
28 is nothing to be disposed of, or how is it disposed
29 of?

30 A As far as any coatings

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Anthony

1 or dirt or debris resulting from the welding
2 operation, it would be a slag which is a solid material,
3 not a whole lot unlike say mill scale on steel.
4 This would be wire brushed off or mechanically cleaned,
5 but it's not a readily soluble material or a liquid
6 or something of that type, if that's what you had in
7 mind.

8 Q How is this residue disposed
9 of?

10 MR. GENEST: Well the question
11 assumes that it's going to be disposed of, and I'm
12 not clear that that inside chemical coating is ever
13 going to be disposed of. Can we have that clear?
14 I don't think you've^{had}/an answer on that yet.

15 MR. ANTHONY: Well perhaps I
16 misunderstood Dr. Holmberg. I understood that the
17 chemical coating inside the pipe will be removed
18 in some manner, is that not correct?

19 WITNESS RATHJE:

20 A No sir. The -- first of
21 all, the coating that is on the inside of the pipe
22 will not come right up the edge of the pipe end.
23 You will have a cut-back area that is bare that will
24 not interfere with any welding process. And the
25 coating is not designed to be removed.

26 Now, I have the names, if you
27 would like in our coating specifications we have
28 listed two coatings which we feel would be acceptable.
29 One is a polyamide catalyzed coating; the other is
30 an amine adduct catalyzed epoxy resin type

1 material, and . both of these have been used for
2 internal coatings of previous pipelines.

3 Q I would be very surprised
4 if the court reporters are able to get that on
5 the record. Perhaps you could return to the -- either
6 spell them, or perhaps just come to see the reporters
7 afterwards.

8 Could you tell me, however,
9 though, the quantities that would be expected to be
10 used for the coating?

11 A These are a very thin
12 coating, in the order of thickness of two mils
13 which is two one-thousandths of an inch.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

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2 WITNESS PURCELL: These
3 are put on normally at the pipe mill, not in the
4 field.

5 Q Do you know whether
6 these coatings are soluable in 25% methanol?

7 WITNESS RATHJE:
8 A No, they are not.

9 Q Now, in page 9 of your
10 evidence, you state under "System Design Heading,"
11 "The determination of the location and performance
12 requirements of the compressor station are
13 within your area of responsibility."

14 Would you describe, Mr. Purcell, the process you went
15 through in deciding the location of the compressor
16 stations?

17 WITNESS PURCELL: We started
18 with the pipe size and the compressor station size,
19 and our design gas volume was the optimum volume
20 that we've referred to as providing the lowest cost of
21 service. Mr. King made computer calculations to locate
22 the hydraulically ideal point for compressor stations.
23 Within Northern Engineering we sent them then to
24 Mr. Williams and Dr. Clark to be sure that the
25 compressor station wasn't being put in the middle of
26 a river, or other unsuitable place. We -- that
27 resulted in most instances in small changes, the
28 order of one or 2/10ths of a mile, and those locations
29 then were given to Canadian Arctic Gas and they had
30 them reviewed for environmental consequences.

Q As a result of that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

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2 review, were any of the compressor stations re-located?

3 A As a result of the
4 environmental review?

5 Q Yes.

6 A No sir.

7 Q And if the environmental
8 consultants had any views as to the desirability of
9 a location, that information would not have been
10 conveyed to you. Is that correct?

11 A I only recall two instan-
12 ces where they had any concerns. I'm speaking from
13 memory now, and it's subject to check, but in one
14 case one of the consultants for a compressor station,
15 I think in the interior route in Alaska, said that
16 a series of valleys through which the pipeline passed
17 was good Dall sheep habitat, and he would like to
18 see the compressor station moved about 70 miles to the
19 east. That's completely intolerable from a design
20 standpoint, we don't have that kind of flexibility.

21 In another case a suggested
22 move was made --

23 THE COMMISSIONER: Excuse
24 me, was it moved at all in that instance?

25 A No sir, it was not,
26 and there didn't seem to be any strong feelings about
27 it on the part of these environmentalists.

28 In another case, a movement
29 of 20 miles, I think, was suggested; but it was not
30 for environmental reasons as much as it was for

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

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2 potential problems of ice bog formation. That move
3 was not made. That again is too large a move.

4 MR. ANTHONY: The environmental
5 input into the question of compressor station locations
6 was directed to Arctic Gas though, was that correct?

7 A Yes sir, they were
8 collecting that information.

9 Q You didn't deal directly
10 with environmentalists in establishing the location?

11 A No, it was -- the
12 environmentalists were not consulted prior to locating
13 the stations. It was a review process.

14 Q Now in the process
15 you've described, and you described it in some detail
16 yesterday, I understand your evidence to be that the
17 number and size of compressor stations is sufficient
18 to move the volume of gas and the pressure that is
19 provided in the application. Now is this true whether
20 the 42 or the 48-inch laterals are used?

21 A Our alternative,
22 Canadian Arctic Gas' alternative application lists
23 different compressor station sites for the 42-inch
24 supply lines than for the 48-inch supply lines. There
25 are more compressor stations required for the 42-inch
26 supply line, for the same gas volumes.

27 Q So the number of compres-
28 sor stations and their location, as far as the North
29 Slope of the Yukon and the Mackenzie Delta are
30 concerned, are still not known.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

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2 A The locations did not
3 change. It was only the construction sequence, the
4 year of construction. We used the same locations.

5 Q So whether you have the
6 42 or 48-inch lateral, the same number of stations
7 at the same locations will result?

8 A The same number of
9 station sites will result. Now the period of time
10 in which you add the compressor equipment to those
11 sites is going to vary between the two pipe sizes.

12 Q Do I understand your
13 evidence correctly with respect to the main line that
14 the size and the equipment that you are proposing to
15 install at compressor station locations there is
16 sufficient to accommodate the fifth year operating
17 volume?

18 A Yes sir.

19 Q And these are installed
20 at the time the compressor station is constructed.

21 A All the compressor
22 stations on the mainline are installed within the
23 five-year period that's shown in the application.
24 Is that the answer to your question?

25 Q Well, I'm wondering
26 in the construction of a compressor station, do you
27 have to re-attend at different stages to install
28 different pieces of equipment?

29 A No sir, we contemplate
30 installing the entire station at one time.

Purcell, King, Koskimaki, Holmberg
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Q So as far as the equipment at the compressor station is concerned, there is nothing there to prevent the looping of the main line?

A No sir.

Q And could the equipment that's presently going to be located at the main line compressor station, is that equipment sufficient to handle two 48-inch pipes?

A No sir, it's only sufficient for one.

Q Well then, if you were to loop the mainline, it would be necessary to duplicate the equipment at each compressor station.

A In order to double the gas volumes, that would have to be done. You would get some increase in throughput if you simply looped the mainline; to get the maximum economics out of the situation you'd have to install the compressor stations.

Q Sorry, you'd have to --

A Install the compressor stations to reach the designed gas volumes, the optimum volumes.

Q Well, assuming the mainline was looped for a moment, would you -- what would it be necessary to do to the existing compressor stations in order to have the optimum throughput in both -- in the line as looped?

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

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2 A Within the area of the
3 site that Mr. Koskimaki illustrated for you yesterday,
4 we would have to put in additional compression and
5 chilling equipment, and the propane condensers, to
6 accommodate essentially the same equipment that is
7 already there. We would not have to duplicate the
8 housing and so forth, and the garage. But the compres-
9 sion and gas chilling equipment would be doubled
10 within that site.

11 Q But you would not
12 have to create any further sites?

13 A That's correct.

14 Q If using the 48-inch
15 lateral which you're now still proposing to use, and
16 on the assumption that the mainline is looped, would
17 you tell me whether it would be necessary to have
18 any further compressor station sites in the Mackenzie
19 Delta?

20 A On the gas supply line
21 from Prudhoe Bay, or from Mackenzie Delta --

22 Q Yes.

23 A -- north of Travaillant
24 Lake?

25 Q Yes.

26 A If gas volumes beyond
27 those shown in the application are required, there
28 would be the addition of more compressor equipment at
29 the sites shown in the application.

30 Q But there would be need

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 for no further sites for compressor stations on either
3 the Prudhoe Bay to Travaillant Lake, or the delta to
4 Travaillant Lake lateral?

5 A That's correct. Adding
6 more compressor stations would result in very unfavor-
7 able economics.

8 Q At the compressor
9 station site itself, could you indicate -- and I
10 wasn't clear from the slides -- how much of the pipe
11 is above ground?

12 WITNESS KOSKIMAKI: The
13 above ground station pipe itself, there is about
14 500 feet above ground inside the buildings, that
15 includes the pipe inside the buildings.

16 Q I understand that you
17 propose to use a thicker pipe for all situations where
18 the pipe is exposed, above ground.

19 A The design factor for
20 station pipe is such that the entire station must
21 be a 1 1/4-inch wall.

22 Q That compares to the
23 .72 for the line that's buried?

24 A Yes sir.

25 Q What is the pipe
26 thickness of the Alaska portion?

27 A At the stations it's
28 still 1.25 wall.

29 Q What about of the line
30 itself?

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

1

2

A .8.

3

Q Why is the pipe thicker

4

in Alaska when it's buried than what it is in the

5

Canadian portion?

6

WITNESS PURCELL: The code

7

requirements of the two countries are different. There

8

has been a lot of discussion and a lot of activity in

9

the United States towards raising the design factor

10

because of the experience in Canada that it's safe

11

to go to a higher design factor.

12

But to date they have a

13

lower ceiling on the stress level in the pipe.

14

THE COMMISSIONER: Excuse me,

15

Mr. Purcell. Are you saying that the minimum wall

16

thickness of the pipe that will carry the gas from

17

Prudhoe Bay to the Yukon border is .8 inches?

18

A Yes sir, it is.

19

Q That is under U.S.

20

regulation .

21

A Yes sir.

22

Q And once this pipe

23

reaches the Yukon border, and enters Canada, it then

24

becomes a pipe with a wall thickness of .72 inches.

25

A That's correct. The

26

Canadian regulations allow a higher operating pressure

27

for the same pipe, or conversely, a thinner wall thick-

28

ness for the same pressure.

29

30

1 Q Well the gas is at the
2 same pressure on both sides of the border, isn't it?

3 A Yes, sir.

4 It's a matter of the codes and
5 the regulations, and like I said, the Canadian
6 experience at the higher stress levels has been good.
7 The metallurgists feel it's safe to operate a pipeline
8 at a higher stress level, and there are discussions
9 and petitions in the United States to increase this
10 design level.

11 Q But for how long, as far
12 as you know, has there been this -- well let me put
13 it this way: The people who developed these regulat-
14 ions in the U.S. and in Canada, are metallurgists
15 and people with engineering expertise, just like you
16 and your colleagues sitting here on the panel.

17 A These code committees to
18 which the regulations refer, are normally composed of
19 people not only from industry, not only from pipeline
20 companies, but from the people who manufacture pipe
21 and the people who regulate pipelines.

22 Mr. Templeton, for an example,
23 is a member of the Committee that developed the gas
24 pipeline code in Canada.

25 Q But the -- is it implicit
26 in what you've said that the Canadian Code Committee
27 is rather more advanced, so far as you are concerned,
28 in its appreciation of appropriate stress levels?

29 A Yes, sir. What I think
30 an important factor is, that in order to operate at

1 that level, the Canadian code requires that the pipe
2 be tested still to 125 percent of the operating
3 pressure, and that's the same minimum test pressure
4 that's required under the U.S. code. The Canadian
5 code allows you to take advantage of having proven
6 that the pipe is safer at a higher pressure.

7 Q But the only tests are
8 tests that you and your client, Arctic Gas, have
9 carried out. The Code Committee in Canada hasn't
10 carried out any tests, has it?

11 A I'm sorry, sir, tests on
12 what?

13 Q Well --

14 A On the safety of this --

15 Q Mr. Gibbs spent all of
16 yesterday seeking to develop the proposition that
17 in many respects, what you -- by you I mean Arctic
18 Gas and all of its consultants, including Northern
19 Engineering and you personally -- Arctic Gas is
20 developing a pipeline system which will be using a
21 pipe of a diameter, and pressurized to an extent
22 unknown in the past, anywhere in the world, so far as
23 we know.

24 The only tests, as I understand
25 the evidence, that have been carried out to determine
26 whether that whole pipeline system is feasible, are
27 the tests that Arctic Gas and its consultants have
28 carried out. The Code Committee hasn't carried out
29 any tests, has it?

30 A I think some of the government

1 metallurgists who are on that code committee have
2 themselves tested samples of pipe that have been
3 produced to the Canadian Arctic Gas specifications.
4 But I am not aware of the results of their tests.

5 Q Well, what concerns me
6 -- concerns me at this point, I would like to know a
7 little more about it, in that sense it concerns me.
8 You have in the United States, a well developed pipe-
9 line industry, a well developed regulatory system
10 for pipelining, so also have you in Canada, and yet
11 the advisors to the two governments have laid down
12 specifications as to wall thickness that are, it
13 appears, significantly different.

14 A There's a difference of
15 about 10 percent.

16 Q Yes.

17 A And originally the two
18 codes were the same, with regard to the stress level
19 in the pipe.

20 Q When did they divert?

21 A Oh, it's been five years
22 at any rate.

23 Q And --

24 A Mr. Holmberg --

25 Q -- which jurisdiction?

26 A Mr. Holmberg says closer
27 to eight or ten.

28 Q I see. Well, are you
29 saying that these wall thicknesses were laid down
30 eight or ten years ago then, the Canadian wall

1 thickness was laid down eight or ten years ago?

2 A I think we remember that
3 it's not the wall thickness itself or the pressure
4 itself that is important, it's the relationship --

5 Q Yes.

6 A -- of the pressure to the
7 dimensions of the pipe. And we are proposing to test
8 the pipe to 100 percent of the specified minimum
9 yield strength, and operate it then at 80 percent of
10 that test pressure, so the code requirement is a
11 general requirement that relates to a large range of
12 pipe sizes and pressures.

13 Q And you apply that formula
14 to the pipe size and the pressure that you
15 postulate in this instance?

16 A Yes, sir.

17 Q And you come out with a
18 different result than you would if you were building
19 the pipeline in the United States. / Yes sir, the
20 Canadian authorities decided it was safe to operate
21 the pipe at a 10 percent higher pressure.

22 Providing it was tested to a
23 pressure 25 percent above that.

24 Q And the Canadian authori-
25 ties reached that conclusion, I take it, about eight
26 or ten years ago, and the Americans have not in the
27 past eight or ten years, seen fit to follow suit?
28 Is that a fair summary of what has occurred?

29 WITNESS HOLMBERG:

30 A I would like to -- perhaps

1 I can give you a little background as to why these
2 differences, and the development of this technique.

3 For many years, gas pipelines
4 were tested with gas. This -- there were a number of
5 reasons for this. It was desirable to keep moisture
6 out of the lines, the operators at that time con-
7 sidered it was, also gas was readily available,
8 it was an economical way of testing, but it was during
9 the testing with gas that these brittle failures
10 developed, and this occurred -- started showing up
11 after the pipelines had increased in diameter/above
12 about 20 inches.

13 Prior to that time, these fail-
14 ures had not been experienced. It was these brittle
15 failures that occurred during gas testing of the
16 pipelines that precipitated all this research work
17 we've made reference to a number of times, at Battelle
18 Memorial Institute.

19 At the same time, there were
20 experiences with some of the pipelines built in the
21 United States during the war. You perhaps heard of
22 the Little Inch and the Big Inch pipelines. These
23 were originally built for transportation of oil,
24 but after the war, they were purchased and converted
25 to gas pipelines, and a large number of failures
26 occurred in some of the electric resistance welded
27 pipe used in some of those lines.

28 This resulted in Texas Eastern
29 Pipeline Company that was operating these lines,
30 doing a large amount of work, and the ultimate result

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
By the Commissioner

1 was they went to high pressure hydrostatic testing.

2 And --

3 Q Testing with water?

4 A Testing with water. Now,
5 testing with water is much safer, as far as -- in the
6 event of a failure, you can't compress water to the
7 same extent that you can compress gas, so you have
8 much less energy stored in the water, so that when
9 you have a failure, you don't have an explosive type
10 of failure, you have a rupture and the water escapes
11 and the pressure drops down immediately. You don't
12 have this retention of pressure over a period of
13 time.

14 Texas Eastern found that this
15 pipe which was failing frequently in service, they
16 could break out during high pressure hydrostatic
17 testing, defective pipe, and they were working with
18 Battelle at the same time on this problem, and a
19 large amount of information was developed, has been
20 developed, showing that the higher the pressure you
21 go on hydrostatic testing, the greater the number
22 of pipe^{with} defects you will remove. You keep -- smaller
23 defects, less sensitive defects, become sensitive
24 and critical as you increase the pressure and subject
25 them to a more severe stress level.

26 So the high pressure hydrostatic
27 testing has become recognized as a very effective
28 test on the pipe after it's been laid in the line
29 and is now looked upon as one of the most effective
30 and important tests made on any type of pipeline.

1 Now this resulted in Battelle
2 preparing a report, I believe the name of the report
3 was the "Feasibility of Basing Design on Test
4 Pressure". As Mr. Purcell mentioned, both companies,
5 or both countries have the requirement that the test
6 pressure be 1.25 percent above the design pressure
7 or the operating pressure.

8 Now, the difference between
9 the --

10 Q You mean 125 percent?

11 A Yeah, 1.25 percent, or
12 125 percent, I'm sorry.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 The
3 difference between the two countries is that Canada
4 accepted Battelle's recommendations and permitted basing
5 your design on 120 or 80% of the specified minimum
6 yield, 80% of specified minimum yield, and 120-25%
7 become equivalent. The Canadian Government accepted
8 Battelle's recommendations and permit operating a
9 line up to 80% of specified minimum yield, provided
10 the line is tested to 1.25% above this 80%, which
11 turns out to be 100% of specified minimum yield.

12 Now the United States does
13 not permit that, and as Mr. Purcell mentioned, there
14 is a lot of activity in changing the Code in the
15 United States. Now the main reason it hasn't been
16 changed is that the objective of many of the pipeline
17 companies was to re-test their lines to 100% of
18 specified minimum yield and thereby be able to increase
19 the capacity of the lines, and the regulatory bodies
20 question the wisdom of doing this and refuse to prove
21 at the time, of going -- of permitting testing to 100%
22 and then operating at 80%.

23 THE COMMISSIONER: What were
24 they afraid of if I can just ask?

25 A Well, they were princi-
26 pally concerned with many of the old lines that were
27 in service that were built of lower quality steel,
28 lower quality pipe, than has been made in more
29 recent years. Does this help give you a little
30 background?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 THE COMMISSIONER: Yes, thank you.

3 A Throw this into focus.

4 MR. ANTHONY: Having it
5 now placed in focus, do I understand the substance of
6 this that the American authorities said, "Given the
7 operating conditions you propose, we demand of you
8 a point 8 inch thickness of pipe." And the Canadian
9 authorities said, "Given the same operating conditions
10 we are satisfied at a .72."

11 A That is correct.

12 Q But you propose to use
13 a .8 at river crossings, for example, do you not?

14 WITNESS PURCELL : A The heavier wall pipe
15 we talked about at river crossings would effectively
16 reduce the stress level. I think it's reduced to
17 .6, is that right?

18 Q What is the wall thick-
19 ness though of the pipe at these river crossings?

20 WITNESS PRICE: 1.034.

21 Q 1.034?

22 A Right.

23 Q And the exposed pipe
24 at compressor stations is 1.25.

25 WITNESS KOSKIMAKI:

26 A Well, Mr. Anthony, I
27 don't know if I made it quite clear but the buried
28 pipe at compressor stations is also 1.25.

29 Q The buried portion from
30 the mainline into the compressor station?

A Yes.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1

2

Q Why is that?

3

A It's because of the design

4

factor which is specified in the Canadian Code and the

5

U.S. Code, they're the same. At stations where you

6

normally have people around the equipment and so forth

7

the higher safety factor is of course specified.

8

Q So a thicker pipe is

9

safer?

10

A Yes.

11

Q Would you tell me

12

whether there are any special design features besides

13

the increase in thickness in pipe, at the compressor

14

stations to ensure the security of exposed pipe?

15

For example, I couldn't tell from the picture but

16

do you have a fence around all the exposed pipe areas?

17

A There is a fence around

18

the entire station. The only difference between the

19

exposed pipe and the buried pipe, or the pipe that's

20

in the building is it may be subject to lower ambient

21

temperatures and therefore it has a lower metal design

22

temperature.

23

Q Could you tell me some-

24

thing about that fence around it, is it around the full

25

perimeter of the compressor station?

26

A Yes sir.

27

Q Tell me how high that

28

fence is.

29

A Well, we haven't really

30

done a detailed design of the fence, but it's probably

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 in the order of 10 or 12 feet, something like that.

3 Q Why are you putting a
4 fence around it?

5 A One reason is it's
6 specified in the code that you put a fence around it.

7 Q Sounds like a good reason
8 to me.

9 A Okay.

10 Q Is there any form of
11 surveillance, electronic surveillance or monitoring
12 of the site?

13 A You mean for unauthorized
14 entrance or something?

15 Q Yes.

16 A No, we haven't proposed
17 that, sir.

18 Q We've heard a lot about
19 the tremendous pressure in the pipe and the amount of
20 strain and so on. Could you tell me, is there
21 any possibility that something like a hunter's rifle
22 if it had bullet, even /hit at a welded seam, might cause a
23 failure in a pipe?

24 WITNESS PURCELL: For the pipe
25 containing gas, I think that would be impossible.
26 I think it would have to be a cannon to damage the
27 pipe. Tests were conducted by Aleyeska, who is
28 proposing a thinner wall pipe, and as I understand it,
29 they used the heaviest hunting rifles available and
30 were not able to damage the pipe.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

THE COMMISSIONER: Excuse me.

Aleyeska is building an oil pipeline.

A Yes sir.

Q Now, they tested their oil pipeline in this way, did they?

A Yes, they did.

Q Well, the steel -- is the steel that you use in an oil pipeline of the same quality as the steel you use in a gas pipeline?

A Essentially, yes sir. It's the same type of steel.

Q And the Aleyeska oil pipeline does not have as thick a wall as the Arctic Gas Pipeline in Canada, is that right?

A Correct.

Q So whatever their pipe resisted, yours would too, is that --

A I think that's safe to assume.

MR. ANTHONY: Q Can you make that assumption, given the fact that -- of the great difference in pressure between the Aleyeska pipe and the pressure you propose to operate under?

A Aleyeska proposes to operate at 72% of the minimum specified yield strength as opposed to 80% in Canada for the Arctic Gas Pipeline. There's not a large difference in pressure in terms of the stress in the steel.

Q Sorry, could you perhaps,

1
2 to clarify in my own mind, what is the P.S.I., the
3 pressure, if I can understand, in the Aleyeska line?

4 A I think it's around 1,000
5 pounds, I'm not sure.

6 Q And the line here is?

7 A Is 1,680. But again it's
8 the stress level in the steel. The fact that we
9 have thicker wall pipe needs to be taken into
10 account in these comparisons.

11 Q But you have done no
12 tests on this particular pipe or this particular
13 pressure?

14 A No sir, we have not.

15 Q And your answer that
16 a rifle bullet would not cause any damage or failure
17 applies for the .72 inch thickness of pipe?

18 A Yes sir, it does.

19 Q So Dr. Hardy's concern
20 which he expressed to us about the security of the
21 pipe above ground because of damage caused by rifle,
22 your advice to him would be that there is no danger.

23 A My advice to him that
24 on this pipeline there is no danger. Now there are
25 many pipelines that are 16 inches in diameter and have
26 a wall thickness of something like two or 3/10ths of
27 an inch. That's something entirely different, and that
28 is something -- that is a consideration in those
29 smaller pipelines.

30 Q But it's not a concern

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 for this one?

3 A Not in my opinion, no.

4 Q I believe at these
5 compressor stations you intend to use what is called
6 a turbine engine instead of the conventional recipro-
7 cating gas driven compressors, is that correct? That's
8 out of your application, I'm not sure I understand it.

9 A That's correct.

10 Q Would you tell me, how
11 do you intend to lubricate these turbine engines?

12 A Mr. Koskimaki?

13 WITNESS KOSKIMAKI: They have
14 their manufacturer's install their own lube oil systems
15 which are part of the package and operate automatically
16 with the package.

17 Q These are called high
18 temperature lubricants?

19 A Yes, some of them are.
20
21
22
23
24
25
26
27
28
29
30

Holmbeg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Anthony

1 Q Are these -- is this an
2 oil or is it a synthetic lubricant?

3 A Well different manufacturers
4 have different specifications for their oil, and
5 I'm not familiar with what's being proposed to be
6 used by the operating and maintenance group. I think
7 if you're going to get into the types of lubricant,
8 they could probably give you a better answer than I
9 could.

10 Q Would they also be the ones
11 to discuss the question of coolants, types, quantities
12 and so on?

13 A Well the -- what do you
14 mean by coolants?

15 Q Well I understand that --
16 MR. GENEST: Are you talking
17 about gas chillers, Mr. Anthony?

18 MR. ANTHONY: Well I understand
19 that because of the great heat in these engines,
20 there is also, besides the lubricating function,
21 there's also a coolant function and often lubricants
22 serve both functions.

23 A Well there is nothing
24 unusual about those. It would probably be the same
25 ethylene glycol mixture which we ^{would} use in the station
26 central heating system.

27 Q I'm interested in getting
28 a catalogue of the chemicals, fuels and lubricants
29 that will be transported to in there and used at the
30 compressor station sites. Would you be able to

1 provide me with that information, or is that the
2 operations and maintenance panel?

3 A They would have a better
4 idea of the lubricants. As far as the coolants, as
5 you call them, well it will probably be a tri-ethylene
6 glycol water mixture, which is conventionally used
7 throughout the industry.

8 Q I would like to deal, for
9 the moment, with the -- on the question of noise and
10 noise abatement. I refer you to the application,
11 Exhibit 54, Section 8, Section 8.b.1.4.3, page 16.
12 It is under the Mechanical and Civil Design heading,
13 Noise Abatement.

14 Do you have that?

15 A Yes, sir.

16 Q In the first paragraph
17 under Noise Abatement, lists the various sources of
18 noise, and I'm instructed that in fact the -- it is
19 the turbine noise that is the single largest source
20 of noise on the compressor station, is that right?

21 A Not entirely, they contri-
22 bute a large amount of the noise. There is also the
23 condenser fans that contribute to the noise, and the
24 electrical generators are turbine driven and contri-
25 bute to the noise.

26 Q Dealing perhaps with both
27 of these sources, could you indicate what techniques
28 are now available to reduce noise from machinery
29 surfaces?

30 A You can install an

1 enclosure around the machinery surface to reduce the
2 noise in the building . Also the noise from the
3 machine surfaces which is located inside the building
4 would be largely attenuated by the building walls
5 and would not contribute largely to the noise outside
6 of the station perimeter.

7 The main source on the turbines
8 is the inlet+exhaust, which can be silenced by various
9 methods that the manufacturers have developed over
10 the years, and they can be silenced to quite a low
11 level of noise.

12 Q These noise abatement
13 techniques, are they indicated by the producers of
14 the equipment, or do you design and implement these?

15 A The producers of the
16 equipment furnish us with available levels of --
17 available sound power levels which we can expect
18 from different degrees of silencing, and then we
19 select that level according to the situation or the
20 location of the station in the environment, or the
21 amount of populated area around the station.

22 Q Do any of these abatement
23 techniques result in a loss of efficiency of the
24 equipment?

25 A There is a slight loss.
26 It's only in the neighbourhood of one percent or so.

27 Q Is that a significant loss
28 from your point of view?

29 A No, sir.

30 Q Pardon?

1 A No, sir.

2 Q Were you then involved in
3 preparing a criteria of acceptable noise levels?

4 A The manufacturers
5 furnished us with what they would term their normal
6 silencing package, and maybe one or two other degrees
7 to increase silencing. What we did was we calculated
8 the noise levels around the station using normal
9 silencing techniques, and also with the maximum
10 silencing techniques that could be available.

11 Now, the maximum ones aren't
12 shown in the exhibit. These ones shown in the exhibit
13 are the normal, or the noise levels which can be
14 expected from the normal silencing techniques.

15 Q You're referring now to
16 page 17, the total sound pressure levels table?

17 A Yes, sir.

18 Q The information provided
19 there is on the basis of the normal techniques used
20 to abate the noise?

21 A Yes, it's more or less
22 the levels which you would install around the
23 station for comfort of the people working at the
24 station.

25 Q Did you demand at any time,
26 criteria that would have less noise?

27 A We have information on
28 the packages that would give us less noise.

29 Q Given this maximum abate-
30 ment package that you referred to, what would be the

relative

1 /reduction in the amount of noise? Perhaps if you
2 could give it in decibels or percentage?

3 A If I can refer to the dBA
4 levels, they are the A weighted levels that are weighted to the
5 sensitivity of the
6 human ear, and the ones shown in the application are
7 at the station fence line, at the centre of each side
8 of the fence, and they run between 61 and 67 shown
9 here. Or 59, I'm sorry, and 67.

10 That could be reduced to around
11 50 or 53, say, with the maximum silencing techniques.

12 Q Without an appreciable
13 loss in efficiency?

14 A Well, to do that, we needed
15 to install the maximum silencing on the turbines, and
16 there isn't too much of a loss in efficiency there.
17 But as far as the aerial coolers are concerned, to reduce
18 the noise from them you have to reduce the tip speed,
19 and you get a loss of efficiency of the air flow
20 through the condenser, and it results in approximately
21 -- oh instead of 44 condenser fans, it would have to
22 be increased to 56 for one manufacturer's type of
23 equipment.

24 Q Well as far as the turbine
25 is concerned, you could reduce the noise from that,
26 the levels you have suggested, without a significant
27 loss in efficiency?

28 A Yes, sir.

29 Q Do you propose to do that?

30 A We furnished our environ-
mental experts with these noise levels, and had some

1 discussion with our environmental consultants, and
2 we had planned that if you had any problems with these
3 noise levels, well we would -- you would have the
4 means available to us to reduce the levels further,
5 to more or less this 50 dBA level around the station
6 fence line.

7 However, in discussing these
8 levels with our environmental consultants, they didn't
9 think that these levels were excessive, so although
10 the means is available to us, to attenuate the station
11 noise further, we haven't proposed to do so.

12 Q Now if I can refer to that
13 table again of the total sound pressure levels, I
14 believe you said that at the A weighted level which is
15 in the middle --

16 A Yes.

17 Q -- of the column there,
18 is in fact a corrected level based on the range of
19 human hearing?

20 A Yes, sir.

21 Q And would I be right in
22 saying that the flat weighted scale at the left of it,
23 is an uncorrected --

24 A Yes, sir.

25 Q -- or unaltered sound
26 reading?

27 A Yes, sir.

28 Q Could you tell me of any
29 studies that you're aware of or that have been brought
30 to your attention, with respect to the hearing range

1 of non-humans?

2 MR. GENEST: Well, Mr. Commiss-
3 ioner, surely that's a question for mammal consultants,
4 the animal, living environment phase of this hearing.

5 MR. ANTHONY:

6 Q So you're not aware of
7 anything, you're relying on --

8 THE COMMISSIONER: Well let's
9 deal with the objection first, Mr. Anthony.

10 Mr. Genest says this is a matter
11 for phase 3. All that this panel is able to do, I
12 take it, is to say what the noise levels will be. In
13 phase 3 evidence can be adduced to determine the
14 effect of those noise levels on the living environ-
15 ment.

16 If you're asking these gentlemen
17 to go into that, I don't think it's going to get us
18 very far unless they're specially qualified to appre-
19 ciate the impact on caribou and other species of
20 these noise levels.

21

22

23

24

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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 MR. ANTHONY: Well I wasn't proposing
3 question specifically.
4 to get into that/ I recognize that we'll have oppor-
5 tunity at a later stage when we meet the environmental
6 consultants Mr. Koskimaki referred to; but I was
7 interested in pursuing the question on another
8 slant of it, to determine whether or not the difference
9 in scale between the flat level and the A level,
10 whether the abatement techniques that are available
11 in these packages have the same effect on the flat
12 level as the A level. So I'm going to the question
13 of the effectiveness of the techniques beyond the range
14 of human hearing experience.

15 THE COMMISSIONER: I see.

16 MR. GENEST: I have no objec-
17 tion to that.

18 WITNESS KOSKIMAKI: When
19 we calculate these noise levels we do it by a frequency
20 band so that the total levels are first calculated,
21 the flat weighted levels, and then we calculate the degree
22 of silencing available also by frequency band, so that
23 the maximum silencing does take into consideration
24 the attenuation throughout, in each part of the
25 frequency range. It is more in some frequencies than
26 in others, and in the calculations we will take that
27 into account.

28 MR. ANTHONY:

29 Q Do you have information
30 available that you could give to the Inquiry on these
techniques and the affect they have on the decibel
rating, flat level?

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

1
2 Or flat weighted?

3 A The methods of calcula-
4 tion in all the sound / ^{power} levels which were used by
5 frequency band, and the formulas that were used or
6 the equations that were used are all documented in
7 chapter 7 of the preliminary station design report.

8 Q I don't have that before
9 me, but could you tell me whether it also gives a
10 decibel rating flat weighted?

11 A Yes sir, it has the
12 same information for -- as is given in this table
13 on page 17 of the application, and it also gives
14 information on noise levels 300 feet from the
15 station and 1,000 feet from the station, with the
16 various techniques of silencing, and then there is
17 another table in there which will give the idea
18 of the effect of shrubbery or trees around the station
19 on the attenuation levels.

20 Q I think that's probably
21 the information I'll require so we'll leave that.
22 One other question about the compressor stations,
23 could you tell me whether there is any vibration at
24 the compressor stations, or on the above ground pipe?

25 A Our experience has been
26 that when operating this turbine type of equipment
27 there is hardly any vibration. It's very small. It
28 is of the type that you could place a nickel on end
29 on the turbine compressor and it wouldn't have
30 enough vibration to fall over. So it's very small.

Purcell, King, Koskimaki, Holmberg
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1
2 THE COMMISSIONER: Well, I
3 think we'll take a break for a few minutes for a cup
4 of coffee.

5 (PROCEEDINGS ADJOURNED FOR FEW MINUTES)

6 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

7 MR. ANTHONY: Perhaps I may
8 continue by just directing a further question to Mr.
9 Koskimaki.

10 Q With respect to Travail-
11 lant Lake compressor station, you have in fact two
12 chillers instead of one. Have you done calculations
13 on the noise levels at that compressor station?

14 A No sir. The data
15 available in, the same sound power level data would
16 be -- could be applied for the extra chilling
17 compressor and the condensers, so that we could
18 obtain that very easily. But we don't have it at the
19 present time.

20 Q So ^{if} you understand the
21 amount of noise from one chiller, you double it and
22 that will be the noise from two?

23 A Well, the sound pressure
24 levels that are shown, if you doubled all of the
25 equipment at the station you would increase the
26 levels approximately 3 D.B. It's a logarithmic
27 scale, and so that when you double the facilities or
28 double the amount of noise you only add 3 D.B. to
29 the level.

30 Q I wonder if you'd be

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

1
2 so kind as to apply this formula and give us the
3 decibel rating at the Travaillant Lake compressor
4 station boundaries and file it at some stage?
5 Could you just file it at some stage?

6 A O.K.

7 THE COMMISSIONER: You were
8 saying that if you double the facilities, you don't
9 double the noise level. Is that the point?

10 A You double the noise
11 energy --

12 Q Yes?

13 A -- but the thing that's
14 referred to as the noise level is on a logarithmic
15 scale, so by doubling the energy you add 3 D.B. to
16 the scale.

17 Q Yes, well if it is log-
18 arithmic it isn't arithmetical so you don't -- it
19 doesn't amount to doubling the noise level, that a
20 person or an animal is conscious of. It is less than
21 that.

22 A Yes sir. The noise
23 levels which can be expected from station MO-3 at
24 Travaillant Lake would be probably less than 3 D.B.
25 higher because there would not be another compressor
26 at that station, and to actually double the noise, the
27 distance has to be the same. So some of the noise
28 would be from the other side of the station. Well, I
29 don't know, I will have to do the calculation. I'm
30 not quite sure of that.

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

MR. ANTHONY: Thank you.

MR. GENEST: Oh, I'd just
like some -- perhaps I lost it and Mr. Koskimaki
understands -- we are undertaking to do what now,
Mr. Anthony?

MR. ANTHONY: As I under-
stand it, to provide the decibel rating at the four
boundaries at the Travaillant Lake compressor station.

Q With respect to the
question of vibration, have you done any studies to
determine the extent that that vibration extends away
from the compressor station site?

A Well, the thing that I
was trying to get at is that the vibration is insig-
nificant. We don't think it will be a problem. I
don't know if you're confusing vibration with ^{the} vibration
caused by reciprocating type compressors where you
have to evaluate this vibration and do a detailed
study to ensure that vibrations won't give you
problems, but with turbine driven equipment, vibration
hasn't been a problem with existing stations.

Q When you say "a problem"
I assume you mean in the operation of the equipment.

A Oh, in something that
could cause fatigue or something like that from
pulsation.

Q Well, my concern may be
that it may not be a problem to the equipment but it
may be for animals who perhaps can feel it, and I'm

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 wondering whether you can give an indication of whether
3 or not that vibration extends beyond the compressor
4 station site, and if so, the quantity or the extent
5 of that effect.

6 A No, I'm not an expert
7 in properties of ground, however in my opinion I
8 don't think that this vibration would extend in the
9 ground around the site.

10 Q You've done no studies?

11 A No sir.
12
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1 Q In respect to the emissions
2 that one might expect from the compressor stations,
3 you refer to a number of sources in the application.
4 Can you tell me whether there are to be any emissions
5 as a result of the lubricants used?

6 A The equipment doesn't
7 consume very much lubricant, and it's my understand-
8 ing, for instance, on turbines you can run them for
9 years without changing the lubricant. Any methods
10 of disposal of the lubricant would have to be handled
11 by the O & M panel.

12 Q Have you completed a cata-
13 logue of the complete list of the emissions and the
14 quantity of emissions expected from the compressor
15 station sites?

16 A We've made calculat-
17 ions for the ground level concentrations of SO₂ and
18 NO₂ which can be expected from some of the turbine
19 equipment that we have at the stations.

20 The output is in the form of
21 computer program, right at the moment I'm in the
22 middle of rewriting Section 6 of this preliminary
23 station design report to document the levels that are
24 to be expected. However, that's not in a form that
25 can be presented at the moment. I propose to have
26 this completed before the environmental panel comes
27 before these hearings.

28 Would
29 Q / This report indicate the
30 emissions at the point of outlet?

A Well, yes it will include

1 the components of the exhaust system, the amount of
2 water, the amount of CO₂, the amount of oxygen and
3 the amount of nitrogen. And the parts per million
4 of NOX and the SO₂ which we based on a gas specificat-
5 ion which limits the amount of sulphur in the gas to
6 20 grains per hundred standard cubic feet.

7 Now, we took the gas specification
8 as the maximum which could occur, and the calculations
9 around the station for the SO₂ ground level concentrat-
10 ions showed that even with this 20 grains, we would be
11 below the limits set forth in the ambient air quality
12 standards.

13 Now, we don't expect to have 20
14 parts per million. I'm informed that that is a quite
15 high number, 2 parts per million -- or I should say
16 we don't expect 20 grains of sulphur; 2 would be more
17 likely to occur, so that the numbers that will be
18 shown in the emission section when I have it finished,
19 will be much higher than will probably occur.

20 However, they are still below
21 the limits of the ambient air quality standards. I
22 should say it's the Clean Air Act.

23 Q I believe we have Mr.
24 Genest's undertaking to provide the reports as they
25 are ready that relate to panels, and I wonder if this
26 report could be made available when it is completed
27 and presented, rather than just prior to the environ-
28 mental panel, if that would be convenient. Mr.
29 Marshall?

30 A Yes, sir.

1 MR. MARSHALL: Yes, I understand
2 that that can be done.

3 MR. ANTHONY:

4 Q On page 29 of the evidence
5 under the emission section, you stated that calculations
6 were made to predict ground level concentration
7 of sulphur dioxide and nitrogen dioxide around the
8 compressor stations.

9 Did you do any studies for other
10 chemical concentrations, or just these two?

11 A Just those two. The carbon
12 monoxide out of turbines is very low, so we didn't
13 feel that would be a problem that we would have to
14 calculate the levels.

15 Q Did you do any studies to
16 incorporate the water emissions for the purposes of
17 producing ice bog and so on?

18
19 A Yes, sir. The amount of
20 water in the exhaust depends on the horsepower that
21 the turbine is outputting; during different ambient
22 temperature conditions the turbines are capable of
23 more or less horsepower. For instance, when it gets
24 colder out, you can get more horsepower out of the
25 turbines, and use a little bit more fuel, so the
26 water content would be higher, but these levels range
27 between 4200 and 6,000 gallons per hour, for the
28 entire station.

29 Q These studies that you
30 are conducting and that will be referred to in the

1 report that you'll be presenting, were these laboratory
2 studies?

3 A Pardon me?

4 Q Were they based on laborat-
5 ory studies or field studies?

6 A The ground level concentr-
7 ations?

8 Q Yes.

9 A The method we used to cal-
10 culate that is a method that's been accepted by the
11 Alberta Department of the Environment. We used this,
12 what they call this pasquel method, and the
13 computer program to calculate these things was ori-
14 ginally written by the Alberta Department of Health.

15 Since then it's been taken over
16 by the Alberta Department of the Environment, and
17 it's a canned program that's available on G.E.
18 time sharing, and we've used this computer program
19 for these calculations, as it's the acceptable --
20 it's the accepted method in Alberta, at least of
21 calculating them.

22 Q Well my understanding is
23 that there are certain conditions which perhaps
24 don't exist there, and I'm thinking in terms
25 of long duration of temperature inversions in very
26 cold temperatures with zero wind velocity.

27 Now, were those sorts of conditions
28 implanted into the computer analysis that you've just
29 described?

30 A The computer program has

1 several atmospheric conditions, but I don't think it
2 takes into account the temperature inversions. It
3 has various levels of atmospheric insulation, as they
4 call it. It's the level of incoming solar radiation,
5 combined with various cloud covers and wind veloci-
6 ties, and these conditions when the temperature is
7 calm, or the atmosphere is calm, are at lower wind
8 velocities. We do not reach very high levels with
9 the ground level concentrations of NO₂.

10 We do, from the output of the
11 computer program, we notice that the time you get
12 high ground level concentration is on a bright, sunny
13 day with high wind velocities, and the wind forces
14 the emissions back to the ground.

15 Now, the theory behind all that,
16 I cannot testify to. It's a theory that since it's
17 been accepted by the Department of the Environment
18 we went ahead and used it without going into the
19 theory.

20 Q Well without getting into
21 the theory itself, you would agree with me, would you
22 not, that there are typical meteorological conditions
23 in the far north of Canada that do not exist in
24 southern parts of Canada?

25 A I guess that's true, I'm
26 not sure though. I'm not a meteorological expert.

27 Q But on the basis of the
28 computer work that you've been doing, these special
29 conditions have not been part of the program?

30 A I'm not sure if the

1 conditions that are incorporated into the program
2 would relate to these conditions or not. I would have
3 to go into it and find out that for sure.

4 Q Perhaps you could and let
5 us know.

6 Now, questions about the concen-
7 tration of SO₂ in and around the compressor stations.
8 This particular problem, though, is the one that
9 you've confronted in the computer program you've
10 described?

11 A Yes, sir.

12 Q And the concentration of
13 nitrogen dioxide?

14 A Yes, sir.

15 Q Well it's perhaps the best
16 thing to do, Mr. Commissioner, before any detailed
17 questioning when the report is finished, since it's
18 rather difficult both for myself and for the witness
19 to answer questions on the computer model and its
20 applicability when he hasn't completed the program,
21 so --

22 MR. MARHSALL: Mr. Commissioner,
23 I might just add on this point, that we had intended,
24 in keeping ^{with} /the phasing of the inquiry to deal with
25 this entire subject as part of the phase 2 of the
26 evidence.

27 MR. ANTHONY: Fine, thank you.

28 Q I wonder if I may direct
29 your attention to the question of the testing of
30 the pipeline, and if I have your evidence correctly

1 as I recall it, the whole line is going to be hydro-
2 statically tested, is that correct?

3 WITNESS REID:

4 A Yes, sir.

5 Q And that it will be tested
6 in sections from about three to ten miles?

7 A Yes, sir.

8 Q And that you intend to
9 install the pipe, put in the backfill and then do the
10 hydrostatic testing?

11 A That's correct.

12 Q And will the backfill be
13 compacted and put in the final form, or the form that
14 it will stay when the pipeline's in operation?

15 A Yes, sir, this will be in
16 the as constructed condition.

17 Q And you propose to use
18 two methods, the warm water method and the methanol
19 method, if I can label them as such?

20 A Water methanol testing
21 will be the predominant testing method north of the
22 60th parallel.
23
24
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26
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30

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 Q Do you do any testing
3 of the line before you start your hydrostatic testing?

4 A The pipe itself
5 is subjected to rigorous testing in its manufacture.
6 In addition, as mentioned previously, we intend to
7 use an electronic internal inspection tool run through
8 the test section prior to the introduction of the
9 test medium.

10 Q I wonder if I may give
11 you a quote or relate some events that were recorded
12 in a newspaper story and get your comments on it, as
13 experts in the field. This relates to a "Globe &
14 Mail" story that appeared at Thursday, April 10th,
15 under the heading:

16 "Interprovincial calls 7 pipeline breaks
17 random and infrequent."

18 A Sorry, I missed the --

19 Q The headline is:

20 "Interprovincial calls 7 pipeline breaks
21 random and infrequent."

22 The part of the story that I am interested in in
23 getting your comments on is as follows, and I'll just
24 read that and ask you to comment:

25 "The seven pipeline ruptures experienced by
26 Interprovincial Pipelines Limited of Toronto
27 between August '73 and July '74 were the
28 result of pipe defects that 'probably were
29 present at the time of manufacture,' accord-
30 ing to the company's vice-president. He told

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Cross-Exam by Anthony

1
2 the meeting of shareholders at the Annual
3 Meeting that 'in all cases the pipe failures
4 were in the area of the
5 longitudinal weld seam.'

6 'Meteorological examina-
7 tion by independent consultants revealed --"

8 MR. GENEST: Meteorological?

9 MR. ANTHONY: Metallurgical,
10 it's been a very long day.

11 "-- metallurgical examination by independent
12 consultants revealed that each break initiated
13 in an existing internal crack and they concluded
14 that these defects probably were present at the
15 time of manufacture and grew gradually during
16 operation. These cracks were initially of a
17 minute nature, and extremely difficult to
18 detect even with the most sophisticated
19 inspection process. Investigation concluded
20 that these defects were random and infrequent."

21 Then the story goes on,

22 "In order to prove the pipe's integrity, we
23 undertook a hydrostatic re-testing program.
24 These sections are being re-tested to 125%
25 of operating pressure, using water as a test
26 medium. In the process of completing these
27 tests, four additional failures occurred.
28 During 1974 over 300 miles of pipeline
29 were hydrostatically tested and a further
30 program of 350 miles is planned for 1975.

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

1
2 As part of a continuing inspection program,
3 1,100 miles of pipeline were inspected using
4 an electronically instrumented device propelled
5 through the pipeline which detects any anomalies
6 in the pipe wall, chiefly corrosion or external
7 defects. An extensive maintenance program has
8 been followed to repair any significant defects
9 and a further 225 miles of pipe are scheduled
10 for inspection."

11 Are you familiar with that
12 pipeline and with these problems?

13 A From the story it indi-
14 cates to me that those failures have occurred because
15 of hydrostatic test had not been conducted. I am not
16 personally familiar with the pipeline.

17 Q You don't know whether
18 in fact hydrostatic testing was conducted?

19 A No, I don't.

20 WITNESS HOLMBERG: May I ask
21 a couple of questions? It might be pertinent.
22 Do you know what diameter of pipe this was?

23 Q No, I'm afraid I'm
24 merely going to ask questions relating in a general
25 nature to the testing and to the test medium, and I'll
26 leave the questions of how the diameter affects it
27 and whether it does affect it to people who are a
28 little more knowledgeable in the area. But I want --

29 THE COMMISSIONER: The
30 Metallurgical Committee ^{should} find out who manufactured

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 that pipe.

3 MR. SCOTT: Perhaps it might
4 help to let the panel see the article. There might be
5 something else in it that --

6 WITNESS REID:

7 Yes, I think Mr. Holm-
8 berg's concern is, if it was defective and did fail,
9 it is not the same type of pipe that will be used
in this project.

10 MR. ANTHONY:

11 Q Well, I'm sure that
12 may be so and I don't intend to go into necessarily
13 that question. I am dealing within the context of
the testing procedures.

14 MR. GENEST: I've never seen
15 that used as a technique of cross-examination, at
16 least successfully, when somebody puts a newspaper
17 article to an expert witness and perhaps the dis-
18 cussion we're having now illustrates why that is not
19 done. You don't know.

20 MR. SCOTT: Mr. Commissioner,
21 there is ample precedent in this Inquiry for that
22 technique. If you recall that I referred to the
23 column in the "Victoria Colonist", if you recall,
24 about the Chinese pipeline.

25 THE COMMISSIONER: Mr. Genest
26 was away that day.

27 MR. GENEST: Oh.

28 THE COMMISSIONER: We're
29 setting precedents in his absence. I think you can
30 use this, but you may find that these gentlemen may

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

1
2 continue to press you for more detail and you may not
3 be in a position to provide it.

4 MR. ANTHONY: Maybe so, but
5 I really would like to get an idea of your general
6 comments on it.

7 Q First of all, it appears
8 in this case that the failure was on the longitudinal
9 welding seam and if I understand the evidence yester-
10 day, when we talked about, for example, Stelco and its
11 ability to provide the sort of pipe to the quality that
12 you require, the concern there was at the longitud-
13 inal weld seam -- is that accurate?

14 WITNESS HOLMBERG: Not
15 entirely. The pipe that Stelco is proposing to furnish
16 and the new pipe mill that they've built will make
17 a spiral welded pipe. It will not have a longitudinal
18 seam but I would say the problem is the same. I
19 might comment that this program that we've referred
20 to in re-testing the line to 125% of the operating
21 pressure illustrates what we referred to earlier,
22 the effectiveness of the hydrostatic test in causing
23 defective pipe to fail, and thereby be removed from
24 the line.

25 Q Well, my concern was
26 raised with the ^{comment} initially that the cracks
27 were initially of a minute nature and extremely
28 difficult to detect, even with the most sophisticated
29 inspection process. Now do you have -- would you
30 agree that this is so?

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Anthony

1
2 A Yes, there are definitely
3 problems in using these so-called sophisticated process-
4 es, and they have to be monitored and handled very,
5 very carefully. The reason I was interested in whether
6 the pipe size is pipe sizes under about 20 inches are
7 generally made by the electric resistance welding
8 process and it's the electric resistance welding
9 process is susceptible to failures -- more
10 susceptible to failures than the type of pipe we're
11 talking about, and it's also more difficult to use
12 the non-destructive testing, that's the sophisticated
13 testing methods, with that type of pipe than with
14 the type of pipe we're talking about.

15 Q That shows the danger
16 of omitting anything in the story. I left out two
17 paragraphs, so that I wouldn't be challenged by my
18 friend as being inflammatory, this related to the
19 pipe and amount of spill and the problems
20 caused at the spill, but I'll read you that one
21 paragraph about the size and see if you wish to
22 comment further.

23 "The four leaks occurred in Western Minnesota
24 on the company's 26-inch and 34-inch lines
25 and three on the 34-inch line in Alberta."
26 Now with those sort of lines, would they be more
27 comparable to the type of pipeline?

28 A Yes, they would be.

29 Q And you would agree
30 then, given the current state of the knowledge that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 even with the most sophisticated inspection process
3 there still is this potential?

4 A That word "most" is
5 a pretty general term that's used rather indiscrimin-
6 ately quite frequently. There's a big variation in
7 the type of non-destructive testing equipment that's
8 installed in the pipe mills, and this is one of
9 the problems that purchasers of pipe have, because in
10 some mills this non-destructive testing equipment that
11 they're using actually does not do an effective job ,
12 and I can see reasons why this situation might have
13 happened. I'm not really prepared to comment on it.

14 MR. GENEST: I think my
15 friend should distinguish between inspection and
16 testing. It seems to me it is essential. A hydrostatic
17 test is not an inspection measure.

18 MR. ANTHONY: No, I don't
19 think we were discussing it on that basis. I was
20 asking for his comments on the statement here
21 that it goes to detect these minute problems, even
22 with the most sophisticated inspection processes, and
23 the processes that are available . The question of
24 hydrostatic testing is a subsequent question, and
25 my question to the panel or perhaps to Dr. Holmberg
26 there is whether or not he knew whether this line had
27 been hydrostatically tested before the re-testing
28 program that's referred to here?

29 A I'm not familiar with it.

30 Q Is anybody on the

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 panel familiar with that?

3 WITNESS REID: From the
4 context of the story, it sounds to me as if the line
5 had not been hydrostatically tested.

6 Q If it had been hydro-
7 statically tested to 125% operating pressure, would
8 it be your opinion that these defects that came up
9 on re-testing would also come up in the initial
10 testing?

11 A Yes, definitely.

12 Q So that once you tested
13 125% pressure, you are satisfied that re-testing
14 at a subsequent time would cause no difference?

15 A No sir. The original
16 hydrostatic test would remove all those defects.
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1 Q Could you tell me
2 what season of the year you anticipate that the test-
3 ing will be done?

4 A Testing will be done during
5 the winter construction season.

6 Q And will the disposal of
7 the testing fluid also take place during the winter?

8 A It will take place at the
9 end of the construction season.

10 Q Could you give me an indica-
11 tion of the water temperature at the time of discharge,
12 using the warm water test procedure?

13 A After hydrostatic testing?
14 32 degrees Fahrenheit.

15 Q So the water then will be
16 discharged then at exactly the freezing point, is that
17 right?

18 A Yes, sir.

19 Q Do you monitor the water
20 as it flows through the testing section, to determine
21 temperature?

22 A During -- after the test
23 section has been filled, in the warm water test method
24 and during circulation, which means warm water is
25 continued to be pumped through the test section, the
26 water at the discharge end is monitored.

27 Q Now, I would be right,
28 would I not, in saying that if there was any
29 ice inside the pipe, using the warm water test method,
30 it would be an undesirable result?

1 A Some ice is likely to form
2 during filling of the test section in the warm water
3 test method. Subsequent circulation of warm water
4 removes the ice.

5 Q To ensure that you've got
6 some margin of safety, would it not be preferable to
7 discharge the water at higher than exactly 32 degrees?

8 A At the end of the test
9 section?

10 Q Yes.

11 A That would be impossible,
12 sir.

13 Q Sorry?

14 A That would be impossible.

15 Q Why?

16 A The hydrostatic test is
17 conducted for 24 hours, and the -- during the 24
18 hours, the water temperature returns to 32 degrees
19 Fahrenheit very rapidly. The reason it does not
20 freeze is because of the latent heat which is a
21 physical property of the water, and it would be
22 virtually impossible to heat the water to such an
23 extent that it would be discharged at higher than 32
24 degrees Fahrenheit.

25 Q I'm not sure that I have
26 it accurate. Are you saying that it's -- not only
27 it's undesirable, but it is impossible for the dis-
28 charge water, in using the warm water test method, to
29 be above 32 degrees?

30 A Yes, sir.

1 Q Would you describe to me
2 what are the worst conditions, so that you could not
3 use the warm water testing method? Dealing now with
4 soil conditions and so on. Where in the conditions
5 that you'll be experiencing along the pipe^{route,} would you
6 not be able to use the warm water test method?

7 A I'm not sure I understand
8 your question, sir. Are you asking me where we plan
9 to use it, or where the limit of practicality would
10 be?

11 Q Well, I'll do both. You can
12 answer in whatever order you feel most comfortable.

13 A North of the 60th parallel
14 we intend to use -- we intend to use water methanol
15 testing as the predominant method.

16 Q Are there any circumstances
17 north of the 60th parallel where you expect to use
18 warm water testing?

19 A I can't think of any, sir.
20 It is not to say that this would not be used, but I
21 cannot think of any specific site that has been
22 identified as a warm water test section.

23 Q Could you give me an
24 indication of the sort of condition that would have
25 to exist before you would use warm water testing
26 north of the 60th?

27 A There would have to be an
28 abundant supply of water for a start. The ground
29 temperature preferably would be relatively warm, not
30 significantly less than 32 degrees Fahrenheit.

1 Q Sorry, not significantly
2 less than -- ?

3 A Yes, sir.

4 Q Have you, as part of your
5 testing program, studied the use of air as a testing
6 medium?

7 A We have considered it,
8 yes.

9 Q Have you conducted any
10 tests on the use of air as a testing medium?

11 A No, sir.

12 Q I understand that the Alye-
13 ska line is using air as a test medium, is that
14 accurate?

15 A I have no knowledge of it,
16 sir.

17 Q Does anybody else on the
18 panel? Mr. Purcell?

19 WITNESS PURCELL:

20 A No sir, I don't know.

21 Q Without any tests having
22 been /conducted, could you tell me why the use of air as a test-
23 ing medium was rejected?

24 WITNESS REID:

25 A Perhaps -- basically the
26 reason is that the test pressure is in excess of the
27 operating pressure, and we do not know of the fracture
28 mechanics or the fracture behaviour of our steel at
29 a stress level in excess of the operating pressure,
30 when using a compressable test medium.

Holmberg, Purcell, King, Koskimaki
McMullen, Reid, Price, Rathje
Cr. Exam. by Anthony

1 Q Mr. Holmberg --

2 A Basically an air test could
3 be catastrophic.

4 MR. ANTHONY: Did you want to
5 comment?

6 WITNESS HOLMBERG:

7 A The objections to using
8 air are very similar to those of using gas, as was
9 just mentioned. The compressability of air, which
10 is a gas,^{is} similar -- is much greater than a liquid,
11 so that in the event of a failure, why it will be
12 more violent and more serious, the consequences could
13 be more serious. But compressing a -- testing a
14 large line such as this with air becomes very expensive
15 and time consuming. It takes a tremendous amount
16 of energy, large compressors and so forth, a very
17 long time to compress the volume of air involved to
18 the pressures required.

19 Q I'm accurate, though, that
20 you can in fact get a 125 percent of operating
21 pressure by using air?

22 A Oh yes, you can do that.

23 Mr. Purcell just called my
24 attention, I think there's a code limit --

25 Q Yes.

26 A -- to which you can go in
27 testing with air or gas.

28 WITNESS REID:

29 A The code limit would be
30 90 percent of the specified minimum yield. We intend

1 to test to 100 percent of the specified minimum
2 yield, and therefore air would not be allowed by code.

3 Q How do you propose to warm
4 the water?

5 A In my slide presentation
6 yesterday, I showed a schematic of the warm -- the
7 water, how the water would be warmed. It is a large
8 heater, which would be big enough to be situated on
9 a flatbed or some such device.

10 Q It would be hauled from
11 test section to test section, would it?

12 A Yes, sir.

13 Q And could you tell --
14 assuming now a test section, a ten mile test section,
15 could you tell me how much water is required in the
16 warm water testing to get it up to the 125 percent
17 pressure?

18 A I gave an example of a
19 five mile test section yesterday. In that case,
20 there was about two and a quarter times the water
21 volume requirement. I believe I have similar figures
22 for a ten mile test section here.

23 For a ten mile test section, the
24 water requirement would be three and a half times
25 the water requirement for a five mile test section.

26 Q If I may put it perhaps
27 in terms that I understand better, I'm advised that
28 a 10 mile test section would require about 4 million
29 Imperial gallons of water. Do you agree with that?

30 A That would strictly be

1 the fill volume. There would be an additional volume
2 of water required to be pumped through the test sect-
3 ion to heat the backfill.

4 Q So in excess of 4 million
5 Imperial gallons?

6 A Yes, sir.

7 Q And what percentage of
8 that volume would be heated?

9 A All of it would be heated.

10 Q Sorry, I'm thinking in
11 terms of now the heater unit that you are using. As
12 I understood the schematic, water is pumped directly
13 from the water course into the pipe; a certain per-
14 centage is put through the heater and heated to 56
15 degrees, I believe, and added to the other water. Is
16 that correct?

17 A The absolute figures may
18 not be correct, but basically you've got the right
19 concept.

20 Q Could you indicate what
21 percentage, perhaps of that volume of water would have
22 to be actually heated through the heater, and how
23 much is directly put into the pipe?

24 A You could heat any combinat-
25 ion of that -- virtually any combination of the
26 quantity you wished. With a high flow rate, you would
27 only heat a small -- sorry, if a high percentage of
28 the volume flowed through the heater, you would only
29 have to heat the water flowing through the heater to
30 a small extent. If a very small portion of the

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Anthony

1 flow were to flow through the heater, you would have
2 to heat it to a high temperature. Any combination in
3 between could be used.

4 Q But you haven't established
5 what combination you propose to use?

6 A The warm water test
7 method is not a predominant test method, and we have
8 not done extensive work on this.

9 I could give you an approximation
10 if you wish?

11 Q It would be helpful.

12 A Approximately 15 percent.

13 Q Thank you. And could you
14 tell me how long the water will remain in the pipe,
15 using the warm water test method?

16 A Approximately 30 hours.
17
18
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30

Purcell, ~~Ming~~, Koskimaki, Holmberg
M cMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 Q Have you done any
3 tests which indicate in an ice-rich soil how far the
4 thaw would extend around the pipe?

5 A Given the specifics,
6 Dr. Slusarchuk could have given you the answer for
7 that.

8 Q I see, so --

9 A We have done, I am not
10 sure exactly what soil type was used. For an example
11 I gave yesterday for ^atypical soil in the Norman Wells
12 region, a 3-inch thaw bulb was created.

13 Q Can you refer us to any
14 other field studies done to examine this phenomena?

15 A Yes sir. A test
16 section on Trans-Canada Pipeline system was monitored
17 during a warm water test to check on the validity
18 of our computer program which was used to develop
19 warm water testing figures.

20 Q Was that in permafrost
21 or non-permafrost soils?

22 A It was in a non-
23 permafrost soil.

24 Q Do you propose in your
25 warm water test method to monitor the water at the
26 point of discharge for quality of the water as well
27 as temperature?

28 A That's not in the
29 current plans.

30 Q Have you undertaken or

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 been advised of any environmental studies describing
3 the effect of placing water at the temperatures you
4 propose to discharge into a frozen stream?

5 A Because of the limitations
6 of warm water testing, we have decided not to use it
7 to any significant extent north of the 60th Parallel,
8 and therefore no studies have been done.

9 Q So your answer is you
10 haven't done any studies because you/ ^{don't} expect to use
11 it?

12 A Yes sir.

13 Q But you may use it in
14 certain instances?

15 A It's conceivable that it
16 could be used.

17 Q In that case you'd want
18 to do some further study, I gather?

19 A If there is a requirement
20 we would definitely, if we see the need for a study
21 we would do it.

22 Q Well, if you're going
23 to use the method, would that not establish the need
24 for a study?

25 A I'm not sure I under-
26 stand what you mean.

27 Q Well, up to this point
28 you say you haven't conducted a study because you
29 don't expect to use the method. I'm saying that if
30 there is a possibility of that method being used,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 in the event that it was to be used, would you not con-
3 duct these studies?

4 A I think the justification
5 for a study would have to be demonstrated first.

6 Q I guess the justification
7 would be if you said you may want to use that testing
8 method?

9 A Not necessarily.

10 Q Let's refer then to the
11 methanol testing. Perhaps just so there isn't any
12 misunderstanding, will you tell^{us} what methanol is?

13 A Methanol is an alcohol.

14 Q Would you agree that
15 it is a highly toxic chemical?

16 A To whom?

17 Q To you or I?

18 A Yes sir, I would not
19 recommend that you drink it.

20 Q Probably suggest it is
21 toxic to fish, birds, animals --

22 A To a different degree,
23 yes.

24 Q Well, we'd all be dead,
25 would we not?

26 A How much do you wish to
27 consume? Sir, all substances are toxic in certain
28 quantities.

29 Q I understand you propose
30 to use a 25% solution as the test medium, is that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 correct?

3 A That would be a typical
4 solution, yes.

5 Q And would you use it as a
6 stronger solution in certain circumstances?

7 A It may be required to
8 use a slightly stronger solution.

9 Q In what circumstances
10 would you use a stronger solution?

11 A On the -- in conditions
12 where extremely low ground temperatures were encountered
13 a stronger solution may be required.

14 Q Now the evidence on the
15 use of methanol, you state at page 17 of your
16 evidence, I believe, that you intend to have this
17 methanol stored in ^{bladder} type storage tanks, is that
18 correct?

19 A Yes sir.

20 Q Would you describe the
21 size of these tanks?

22 A They come in various
23 sizes. I am not familiar with the physical -- the
24 absolute physical dimensions of them.

25 Q Do you know whether it's
26 possible for a bullet to penetrate the ^{bladder} type of
27 storage facility?

28 A I'm not aware of any
29 tests but I would not be surprised if a bullet could
30 penetrate one.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 Q Are you responsible as
3 a design group to recommend to Arctic Gas the nature
4 of their methanol storage facilities?

5 A I myself have not
6 recommended methanol storage facilities.

7 Q Is that part of your
8 area of responsibility?

9 WITNESS PURCELL: I would think
10 we would make a recommendation, yes sir, from our
11 standpoint.

12 Q And have you examined
13 the problem and made any recommendations with respect
14 to the handling or storage of methanol?

15 WITNESS REID: The exhibit
16 contains numerous references as to this, sir. I
17 could perhaps give you some references, if you wish.

18 Q What exhibit are you
19 referring to?

20 A I refer to it as 14-D-N
21 of the Environmental Impact Assessment.

22 Q In that exhibit have
23 you recommended the use of ^{bladder} storage facilities
24 for methanol?

25 MR. GENEST: Let's take a look
26 at the exhibit.

27 A The reference I have
28 is 14-D-6.3.1.

29 MR. ANTHONY: Could you tell
30 me what recommendations with respect to storage of

Purcell, King, Koskimaki, Holmberg
M cMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 methanol is contained?

3 A I'm sorry, paragraph
4 8 is not the right reference. Paragraph 2; states:

5 "Other substances used during construction
6 and operation of the pipeline such as pipe
7 coating materials, lubricating materials,
8 flushing agents, and possibly pipe testing
9 solutions, will receive special care in
10 transportation, storage and disposal."

11 This makes reference to the disposal -- sorry, the
12 storage techniques that will be used for methanol.

13 Q My question, though,
14 was what recommendations have you made to fulfill
15 that general policy statement you've referred to?

16 A We have recommended that
17 they be stored in dike storage areas and bladder
18 tanks.

19 Q Have you made any
20 recommendation with respect to underground storage?

21 A During testing the
22 solution will be stored in the pipe, if that's what
23 you refer to as underground storage.

24 Q No, I'm thinking in
25 terms of the storage stockpiles.

26 A We have not made any
27 recommendations for that. I'm not aware of any
28 recommendations like that.

29 Q Have you made any
30 recommendation with respect to the storage of

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 methanol and how close it should be stored to water
3 courses?

4 A No sir.

5 Q Is that in your area
6 of responsibility also?

7 A No sir.

8 Q Who would make those
9 recommendations to Arctic Gas?

10 A If our environmentalists
11 are concerned about the storage of methanol with
12 respect to water courses, I'm sure they would make
13 recommendations known to us.

14 Q They would make these
15 recommendations known to you?

16 A They certainly would.

17 Q And have they made any
18 recommendations to you with respect to the storage
19 of methanol?

20 A I'm not aware of any.

21 Q As far as you know, they
22 are satisfied with the techniques you propose?

23 A Yes sir.

24 Q Using the methanol test
25 method,
26 how long is the pressure maintained within the pipe?

27 A The test pressure is
28 maintained for a minimum of 24 hours.

29 Q If a fracture should
30 result, or a welded seam break, how long would it take
for the pressurizing system to shut down?

Purcell, King, Koskimaki, Holmberg
M cMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 A During the test, the
3 test section is sealed and there is no pressurization
4 -- no pressurizing equipment being used.

5 Q So that I understand it
6 exactly, the 10-mile pipe section is sealed, the
7 pressure is built up to 125%, is that accurate?

8 A No sir.

9 Q Would you explain that?

10 A It's incorrect in that
11 yesterday I explained -- I believe it's two days ago now
12 I explained in my slide show that methanol test sec-
13 tions would be three miles in length. Now what
14 happens is the test section is sealed off and
15 pressurized, and then the last valve is closed.

16 Q And it's kept that way
17 for ?

18 A 24 hours.

19 Q If a seam should burst
20 in the line during that system, there is a certain
21 pressure, of course, built up within that line, would
22 that then force the test fluid to be expelled through
23 the fracture, or first seam?

24 A There would be
25 instantaneous pressure release.

26 Q Given examples for a
27 sample situation of the test system, and a line of
28 using your best example of a 3 degree -- on a three
29 degree angle, what is your estimate of the amount of
30 test fluid that would be expelled through a bursting

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 of the welded seam?

3 A You would have to be
4 specific as to where the failure occurred, sir.

5 Q Well, let's say right
6 at the most crucial point that would cause the largest
7 expulsion of fluid.

8 A It's theoretically poss-
9 ible that all the liquid could drain from the line.

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1 Q Now, in that circumstance,
2 what would you have to do, knowing the repair of the
3 pipe itself? Do you have to dig up the backfill?
4 That contained the test fluid?

5 A No , sir.

6 Q What would you do in that
7 area where the methanol test fluid has been absorbed
8 into the surrounding soil or ponded on the top?

9 A The methanol would be
10 recovered by suction pumps; the methanol solution
11 would be recovered by suction pumps.

12 Q That's the part that's
13 ponded on the top?

14 A Yes, sir.

15 Q And of course you couldn't
16 do it if the break should result in expulsion into a
17 stream or a river?

18 A No, sir.
19 about

20 Q What/where it's absorbed
21 in the soil surrounding the break? Would you propose
22 to do anything to recover that methanol infected
23 soil, if I may use that phrase?

24 A No sir, the recovery would
25 only be applied to methanol that is free as a liquid.

26 Q Have you done any studies
27 on the toxic effect of methanol left in the soil?

28 A Yes, sir.

29 Q Given that situation of
30 a soil with methanol embedded into it, do you propose
to just leave it in that state, is that right?

1 A The ground is frozen during
2 testing, and the methanol would not penetrate the
3 ground. There would be perhaps some methanol in the
4 backfill.

5 Q So -- have you tested this
6 phenomena and come to any calculations as to the amount
7 that would be ponded, and the amount that would
8 remain?

9 A Any ponded methanol would
10 be recovered, sir.

11 Q Yes, but I was thinking in
12 terms, have you tested the question of how much of
13 the methanol in a situation of discontinuous perma-
14 frost, where there is no unfrozen ground; how much of
15 it would be absorbed by the ground and how much would
16 be ponded?

17 A We do this during the
18 winter construction season, and any ground would be
19 frozen at the time, even in the discontinuous zone.

20 Q But your break is taking
21 place six or ten feet ^{perhaps} below the ground surface.

22 A The pipe ditch has been
23 opened and the pipe wall freezes during construction.

24 Q Sorry, I didn't -- ?

25 A My understanding is that
26 the pipe wall -- sorry, the ditch wall freezes and
27 in fact there is frozen ground adjacent to the pipe.

28 Q But the time of the
29 methanol testing, your evidence is that the methanol
30 will rise to the surface because the ditch or the

1 trench will have frozen ground around the pipe? Is
2 that correct?

3 A Generally true, yes.

4 Q Now, in response to the
5 Pipeline Application Assessment Group question 53,
6 you say that you expect to use 500,000 Imperial gallons
7 of methanol per spread. Is that still your anti-
8 cipated usage?

9 A Yes, sir.

10 Q And by spread, what do you
11 mean? Do you mean construction spread or test site?

12 A Yes sir, construction
13 spread.

14 Q And how many construction
15 spreads are there north of the 60th parallel?

16
17 WITNESS PURCELL: That is in one
18 of the applicant's volumes and we could look it up.

19 Q The question I'm really
20 getting at, and if you have that answer we can ignore
21 the preliminary one, is the total amount of methanol
22 that you will be required -- that you will require
23 for your testing program north of the 60th parallel?

24 MR. GENEST: I think that is in
25 the application material.

26 MR. ANTHONY: Well, there's a
27 couple of answers, that is why I would like to clarify
28 the point.

29 Q Mr. Purcell, do you have
30 -- I'm sorry, are you -- I can say that the Pipeline
Application

1 Assessment Group response gives ^{the}/estimate in the terms.

2 I gave it, per construction spread. If it will help
3 you, I can say that in Section 13A.3.1, figure 2 of
4 the application, that it indicates ^{there} that they will be
5 transporting 25,000 tons of methanol, which I under-
6 stand is in the conversion factor of 8 pounds per
7 Imperial gallon, so 6 million Imperial gallons of
8 methanol. Would you agree with that figure?

9 WITNESS REID:

10 A 25,000 tons I believe is
11 a rounded-off figure.

12 Q That's your estimate of
13 your methanol requirements north of 60? At present?

14 A I would like to check the
15 reference in the application. That may be a one
16 year's requirement.

17 Q I don't believe so.
18 But perhaps --while your counsel is checking that.
19 I will give you the references, 13.a.3.1. figure 2,
20 the heading is "Material to be Transported", and it
21 gives various construction spreads, and the fourth
22 item -- or third item under each of those headings
23 is "Methanol". And that's in thousands of tons.
24 If you will trust my figuring, there is 12,000
25 tons in Section A, 3,000 tons in Section B, and
26 Section E, which is the Alaska/Yukon border to
27 Travaillant Lake is 10,000 tons for a total of
28 25,000 tons.

29 A And your question, sir?

30 Q Well I converted that just

1 to make it simpler for my mind, in any event, to
2 Imperial gallons, of 6,000,000 Imperial gallons,
3 and I'm wondering if that is your anticipated methanol
4 requirement north of 60?

5 A The calculations I've done
6 here very rapidly tend to indicate that it might be
7 slightly larger than that.

8 Q What is your understanding
9 then of your requirements for methanol?

10 A It could be as large as
11 40,000 tons.

12 Q Sorry, 40,000 tons?

13 A Yes, sir.

14 Q That would be something
15 like five and a half million Imperial Gallons? Sorry
16 --

17 A I would have to -- excuse
18 me, I'm thinking in terms of the entire line north
19 of the 60th parallel, and I was thinking in terms of
20 Alaska also. The figure 40,000 tons I gave you would
21 include Alaska, and you would have to subtract about
22 10,000 tons for Alaska. So the figure may be ^{as} high
23 as 30,000 tons, 25 or 30,000 tons.

24 Q Well, that seems like an
25 awful lot of methanol, but I suggest to you that in
26 fact your requirements for this system would be even
27 greater than that, and I refer you -- and I would just
28 like to get your comment on a report of yours -- of
29 Arctic Gas, and this ^{from} a Canadian National-Canadian
30 Pacific report entitled "Logistics Planning, Gas

1 Pipeline". Volume 2, this is report 150 in the list
2 of reports, presented by Arctic Gas, and I refer you
3 to Appendix C.11.1. Unfortunately, there's just the
4 one volume available here of the report, and I will
5 perhaps give it to you, to the panel so that they can
6 look at it and make some notes of what it says there.
7 But perhaps I could just use it for a moment to outline
8 what is indicated.

9 Appendix C.11.1 is entitled
10 "Methanol Delivery Requirements", and it provides
11 three winter construction periods, they are dated
12 1976, '77, '78 -- '77-78 and '78-79. I'll just do
13 it in terms of winter construction phase 1, 2 and 3.
14 And according to that, the table set out there,
15 in the first winter construction period, we are
16 advised that there are ten construction spreads with
17 a total requirement of nine point six million
18 Imperial gallons of methanol.

19 MR. GENEST: Is that ten in the
20 north?

21 MR. ANTHONY: Yes, these are
22 spreads between Holmes Creek, Inuvik, down to Enter-
23 prise. I can give the names of the spreads if it
24 assists, but I am advised and I am satisfied myself
25 that they are all north of 60, and they do not
26 include the Alaska portion.

27 The second winter construction
28 season, lists a total of 13 construction spreads,
29 and a requirement of 11.5 million gallons of methanol.

30 And the third winter construction

1 period, excluding the part that is required for the
2 Alaska portion, has eight construction spreads with a
3 requirement of nine point six million Imperial
4 gallons of methanol. That provides a total of 31
5 construction spreads in Canada, with a requirement
6 of 30.7 million Imperial gallons of methanol.

7 Now, given your calculations,
8 would you agree with that calculation of the methanol
9 requirement north of 60?

10 A No, sir. I am just check-
11 ing, but I think you will find that the construction
12 plan filed in the application shows a significant
13 fewer number of spreads.

Purcell, King, Koskimaki, Holm-
berg, McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 I believe
Q that is accurate and that

3 is the reason why I've asked some of these questions.
4 The question directed, though, is really to the amount
5 of methanol required . Now could you tell me whether
6 that requirement of 30.7 million gallons is still your
7 anticipated methanol requirements?

8 A Is the 30.7 million
9 gallons the quantity contained in that report?

10 Q That's right.

11 A That is no longer current,
12 sir.

13 Q And what is your current
14 methanol requirement then?

15 A 25 to 30,000 tons, sir.

16 Q And could you give us
17 a conversion of that into gallons, since we seem to
18 be dealing with different units?

19 MR. GENEST: Well, can't we
20 do that -- well, I withdraw that. We can have it
21 in pints, too.

22 MR. ANTHONY: Well, if the
23 application is going to refer to other parameters,
24 --

25 THE COMMISSIONER: Get
26 it into gallons, I'll do the conversion into pints.

27 MR. ANTHONY: Mr. Commissioner,
28 so I can make it clear, there is other evidence avail-
29 able with respect to other parameters that are quoted
30 in different volumes, and I'm trying to get a common

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 description so we can compare them. Unfortunately,
3 the application uses tons in one point, gallons in
4 another point, and pounds in a third, so I'd like to
5 just get some agreement to start off with.

6 A The quantity in gallons
7 would be between 6 1/4 and 7 1/2 million gallons.

8 Q Well, given this quan-
9 tity of methanol to be used in your testing program,
10 it may just be a matter of mathematical calculation
11 which I would gladly leave to you rather than to me,
12 but could you tell me what your water requirements
13 would be to have the test fluid at the concentration
14 you propose to use?

15 A It would be between
16 18 and 3/4 and 22-1/2 million gallons.

17 Q Billion or million?

18 A Million.

19 Q How many times do you
20 propose to review the same methanol testing liquid?

21 A The same test solution
22 will be re-used about 20 to 25 times.

23 Q On a three-mile test
24 section?

25 A On 20 to 25 subsequent
26 three-mile test sections, yes.

27 Q That would be 60 to 75
28 miles of line would be tested with each methanol
29 solution, roughly?

30 A As much as 140 miles

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 would be tested with one -- oh, excuse me, my first
3 answer may have to be corrected. 140 miles will be
4 tested with one solution, dividing that by three, we
5 would end up with 47 re-uses of that solution.

6 Q Does the methanol test
7 solution break down so that additional methanol has
8 to be added each time the solution is re-used?

9 A No sir.

10 Q What percentage of the
11 test solution do you expect to lose to either spillage
12 or residue within the pipe section?

13 A I have no way of
14 calculating that, sir.

15 Q But you are confident
16 in any event that the test fluid/would be required
17 in the first section can be re-used as much as 47
18 times.

19 A Yes sir.

20 Q Without the necessity
21 to add methanol or water?

22 A Yes sir.

23 Q Now you are then left
24 with a vast amount of ^{the} methanol solution or test
25 fluid, rather, to dispose of, and you propose two
26 methods, as I understand it. The dilution to 1%
27 solution and discharging, and the second is a distilla-
28 tion method. Can I deal with the first one, the dilu-
29 tion method; and as I understand you propose to dilute
30 the test fluid to 1% methanol by weight, is that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 correct?

3 A That's one of our
4 alternatives, yes.

5 Q What other alternatives
6 are available?

7 A Distillation of the
8 solution.

9 Q Going back, using the
10 dilution method, you propose then to dilute it to 1%
11 solution.

12 A If we were to choose
13 this method, that's what we would do, Correct.

14 Q Now to dilute this
15 solution, which is now at 25%, to a 1% solution how
16 much more water do you require?

17 A Can you excuse me for
18 a minute while I figure that out?

19 Q Certainly.

20 A 25 times the volume of
21 the test fluid.

22 Q Well, assuming that
23 you have your 6-7 million gallons of test fluid,
24 you're talking about approximately 175 million gallons
25 of water?

26 A Where does the 67 million
27 gallons of test fluid come from?

28 Q 6-7 , the range.

29 A And what does that 6-7
30 million gallons represent?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 Q I understood that that
3 was the water requirement in order to use, for the
4 total methanol solution north of 60, is that not
5 correct?

6 A Are we talking one
7 spread or all the spreads sir?

8 Q I'm talking all the
9 spread.

10 A All the spreads, okay.

11 Q So you total
12 water requirement then would be in the range of 175
13 million Imperial gallons?

14 A Is that your calculation?
15 Well that's

16 Q 7 times 25, and your
17 advice is that it's 25 times the amount of solution
18 you have?

19 A O.K., correct.

20 Q Thank you. Would you
21 describe the research done in the process by which
22 you arrived at the conclusion that a 1% solution
23 would be acceptable for discharge?

24 A This figure was arrived
25 at from two sources, one was reading the literature
26 on the toxicity of methanol, and the second were
27 a series of programs or tests conducted by our own
28 environmentalists or under the direction of our environ-
29 mentalists.

30 Q And have you had reports
from these environmentalists on their anticipated

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 effect?

3 A Yes sir.

4 Q And do these reports
5 confirm your understanding that a 1% solution is
6 acceptable?

7 A Yes sir.

8 Q Using the distillation
9 process, the second alternative that you provide
10 for getting rid of the methanol. My understanding is
11 that you concentrate it to a 70% methanol by weight
12 which is either burned or recovered for secondary
13 use, is that accurate?

14 A Yes sir.

15 Q Now to burn this methanol,
16 can it burn alone or do you need further flammable
17 fluids?

18 A No sir, it will burn
19 alone.

20 Q And how do you propose
21 to burn it?

22 A It would be burned in
23 a special incinerator designed for the destruction of
24 this solution.

25 Q And have you done any
26 studies or have you any facts on the emissions result-
27 ing from the burning of this concentrate?

28 A The emissions would be
29 carbon dioxide and water.

30 Q Sorry, have you done --

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 A No studies have been
3 done.

4 Q Thank you. What do you
5 do with the methanol residue that is not burned?

6 A Are you talking of the
7 1% waste water?

8 Q No, I think in fact
9 you have 2% of the total methanol remains, using this
10 distillation process.

11 A The 1% solution contains
12 2% of the total methanol that is required in the
13 spread.

14 Q So when you distill down
15 to 70% by weight, the resultant is that a 1%
16 concentration, is that correct?

17 A There are two streams.
18 One comes off the top as the distillate. It is 70%
19 methanol and contains 98% of all the methanol that
20 was in the test fluid. Off the bottom of the distilla-
21 tion column comes a 1% methanol solution.

22 Q And this would then be
23 discharged in the same way as the original --

24 A This would be suitable
25 for discharge, yes.

26 Q Page 14 of the evidence,
27 you state that:

28 "Other groups investigated the environmental
29 and geotechnical effects of testing and we
30

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 are confident that the pipeline can be tested
3 safely."

4 Are there any other reports other than those listed
5 in Appendix P upon which you rely in making that
6 statement?

7 A I would like to check
8 Appendix B first. In perusing Appendix B, I do not
9 see a report which is filed with the application as
10 part of the biological report series.

11 Q Would you identify that
12 report?

13 A I know it as McMann &
14 Cartier's Report.

15 Q Just one other point
16 then. Mr. Purcell, yesterday you handed your
17 11th hour statement on overhead pipe versus buried
18 pipe, and getting through the argument and dramatics
19 of it, is it not what you're saying is that --

20 MR. GENEST: What's this
21 editorial comment, Mr. Commissioner? I wish -- it's
22 not proper for counsel to do that.

23 MR. ANTHONY: Well, O.K., I'll
24 rephrase that.

25 THE COMMISSIONER: I think that
26 the point is well taken, Mr. Anthony. I think you
27 all know I don't take any account of those editorial
28 remarks, but in fairness to Mr. Purcell, the question
29 of an elevated line was raised in cross-examination
30 and the paper that was presented yesterday was prepared

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 to give us all a complete response, by Arctic Gas to
3 all those questions , and I for one appreciate it,
4 and it's not fair to describe it as 11th hour; but
5 Mr. Genest, these things are going to be said from
6 time to time, and I'm not writing them down and putting
7 a star beside them.

8 MR. GENEST: I hope I may be
9 allowed to bridle that. I won't do it too often.

10 MR. ANTHONY: I certainly do
11 appreciate the statement, too, and I perhaps was
12 leading arguments when I shouldn't, but would I be
13 fair if I characterized your evidence that you provided
14 in the statement that it is your view that assuming
15 the frost heave and these other geotechnical problems
16 have been solved, that for costs and aesthetic
17 reasons that you mentioned, a buried line
18 is the best solution. Is that what you stated in that?
19
20
21
22
23
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28
29
30

1 A Primarily for reasons of
2 security and reliability of service , also including
3 aesthetics and cost.

4 Q Okay, and this is based on
5 the assumption that the geotechnical problems and the
6 frost heave problems as you state in your last para-
7 graph of your statement of being satisfactory dealt with?

8 A Yes sir, that's correct.

9 Q Would I be right in saying
10 that if these geotechnical problems have not been
11 solved, that in your view the alternative modes should
12 be examined further?

13 A If it's not possible to bury
14 the line, then it certainly follows you would have to
15 examine alternatives.

16 MR. ANTHONY: Okay, I've got no
17 further questions.

18 Thank you.

19 MR. SCOTT: Mr. Commissioner,
20 just before the end of the day, assuming we're not
21 going to begin the cross-examination by others, and
22 it's almost one, could I refer to two matters?

23 You will recall, and the parti-
24 cipants will recall that after meeting with officials
25 of the Department of the Environment sometime ago, I
26 circulated to each of the participants a document
27 prepared by a task force in the Department of the
28 Environment called "Digest of Environmental Concerns".
29 This was circulated merely as a digest so that each
30 participant would feel that he had had made available

1 to him at the earliest possible time, the full cooper-
2 ation of the Department of the Environment, and had
3 had the advantage of full disclosure of the material
4 that they were working on.

5 I indicated then that the digest
6 would be followed by a more formal report of the
7 Department's task force on the Mackenzie Valley
8 Pipeline. That report is now at hand, and I just
9 thought for the purposes of the record, that I should
10 indicate that a copy has now been prepared, and I
11 think provided, or is in the course of being provided
12 to each of the participants before the Inquiry.

13 The second matter is you will
14 recall that in one of the earlier phases, I forget
15 which, the question of obtaining the evidence of Mr.
16 Fielder of Arctic Gas with respect to his trip to
17 the Soviet Union was canvassed.

18 I have discussed the matter with
19 Mr. Genest who made certain inquiries, and he proposes,
20 and I think it sounds satisfactory, that Mr. Fielder
21 should be called immediately following the construct-
22 ion panel to be examined and if advisable, cross-
23 examined at that time. There is no purpose in putting
24 him on the construction panel, because he would have
25 to be here for sometime and it would be unnecessary,
26 but it would be hoped that immediately following that
27 panel, he could be heard.

28 Mr. Genest will be filing, as I
29 understand it, a copy of a report that Mr. Fielder
30 has made to the Government of Canada about that trip,

1 and a copy of the Government of Canada's report,
2 which I think includes --

3 MR. GENEST: Well, I propose --
4 a
5 it's/very thick report. I propose to have it avail-
6 able. I didn't understand that I was to make a lot
7 of copies of it, unless I'm otherwise directed. But
8 you can look at it, Mr. Scott.

9 MR. SCOTT: Well, Mr. Genest,
10 you have done very well so far, I know that you will
11 make every effort. If it's not possible to duplicate
12 it, I know that Mr. Genest will make it readily avail-
13 able.

14 I take it that that perhaps with
15 some addition, will form the summary of Mr. Fielder's
16 evidence.

17 MR. GENEST: I also have a sum-
18 mary of his testimony.

19 MR. SCOTT: I see.

20 MR. GENEST: Which I propose to
21 distribute.

22 MR. SCOTT: Well then I'm
23 obliged and I would propose that that is a satisfact-
24 qry way to get Mr. Fielder's evidence before the
25 Inquiry if you're satisfied with that, sir, and if
26 the other participants are satisfied.

27 THE COMMISSIONER: Well, we have
28 cross-examination yet to come from Mr. Bell, Mr.
29 Bailey and you, Mr. Scott. We'll adjourn until
30 9:30 Friday morning, but Friday we'll sit from 9:30
til 1 and then from 2:30 onward in the afternoon, and

1 then again on Saturday to complete cross-examination,
2 and to hear the motion about the future scheduling
3 of the Inquiry that Mr. Anthony wished to raise.
4 That would enable us to begin the construction panel
5 Monday morning, Monday afternoon at one.

6 Now, I don't want counsel who
7 have yet to cross-examine to feel pressed. If it
8 turns out that we just cannot complete the examination,
9 this panel will have to come back next week, but I
10 think we should try.

11 MR. SCOTT: Well, I'm sure, Mr.
12 Commissioner for my part, I won't feel pressed, as I
13 have indicated in the past and I am sure the other
14 counsel will be induced to feel as I do about the
15 matter.

16 THE COMMISSIONER: Well --

17 MR. BELL: Mr. Commissioner,
18 we will try and keep our argument to a minimum.

19 THE COMMISSIONER: Well, I
20 apologize to all of you and to you, Mr. Purcell and
21 your colleagues, for not being able to be here
22 tomorrow. That means a day when we will not be able
23 to sit, but it may work out to the advantage of all
24 if
25 of us, because/counsel have more time to prepare
26 their cross-examination, it's something like a
27 speech. If you have more time to prepare it, it
28 may well be shorter, and we can all look forward to
29 that.

30 So we'll adjourn to Friday

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje

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4 APRIL 18TH, 1975)
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347
M835
Vol. XXXI

AUTHOR

Mackenzie Valley pipeline inquiry:

Vol. XXXI 16 April 1975.

DATE DUE /

BORROWER'S NAME

347
M835
Vol XXXI

MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF AN APPLICATION BY CANADIAN ARCTIC
GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT
BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON
TERRITORY AND THE NORTHWEST TERRITORIES FOR THE
PURPOSE OF THE PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

April 18, 1975.

PROCEEDINGS AT INQUIRY

VOLUME XXXII

CANADIAN ARCTIC
GAS STUDY LTD.

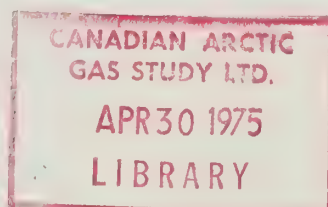
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APPEARANCES:

Mr. Ian G. Scott, Q.C.	
Mr. Stephen T. Goudge,	
Mr. Alick Ryder and	
Mr. Ian Roland	for Mackenzie Valley Pipeline Inquiry;
Mr. Pierre Genest, Q.C.	
Mr. Jack Marshall,	
Mr. Darryl Carter and	
Mr. John Steeves	for Canadian Arctic Gas Pipeline Limited;
Mr. Reginald Gibbs, Q.C.	
Mr. Alan Hollingworth	for Foothills Pipelines Ltd.;
Mr. Russell Anthony, and	
Prof. Alastair Lucas	for Canadian Arctic Resources Committee;
Mr. Glen W. Bell and	
Mr. Gerry Sutton	For Northwest Territories Indian Brotherhood and Metis Association of the Northwest Territories;
Miss Lesley Lane	for Inuit Tapirisat of Canada and The Committee for Original Peoples' Entitlement;
Mr. Ron Veale and	
Mr. Allen Lueck,	for Council for Yukon Indians
Mr. Carson H. Templeton,	for Environmental Pro- tection Board;
Mr. David Reesor,	for Northwest Territories Association of Munici- palities;
Mr. Murray Sigler,	for Northwest Territories Chamber of Commerce.

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I N D E X

Page

WITNESSES FOR APPLICANT:

Hoyt PURCELL

Graeme George KING

Carl M. KOSKIMAKI

Milton E. HOLMBERG

John T. McMULLEN

Patrick St. John PRICE

Kenneth E. RATHJE

Cameron M. REID

- Cross-Examination by Mr. Anthony (cont) 4000
- Cross-Examination by Mr. Bell 4003
- Cross-Examination by Mr. Bayly 4017
- Cross-Examination by Mr. Scott 4074
- Re-Examination 4161

Yellowknife, N.W.T.

April 18, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. GENEST: Are we in session, sir?

THE COMMISSIONER: Yes.

MR. GENEST: Thank you. Before the cross-examination continues, I wonder, sir, I've spoken to Mr. Anthony about this, at page 3938 of the transcript, which is the last day, April 16th, Mr. Koskimaki was answering questions about the sound tables, sir, that appear at page 17 of Exhibit 54, which is the Sections 8 and 9 of the application, and Mr. Anthony was asking questions about the differences between the flat weighted table, the A-weighted table, and Mr. Koskimaki was concerned that he may have left the -- it's apparent from reading the transcript that Mr. Anthony was under the impression that the flat-weighted scale took into account frequencies beyond the range of human hearing, and Mr. Koskimaki is concerned that the Commission may be left with that impression. It is not so, and I wonder if -- I've talked to Mr. Anthony about it and I wonder if Mr. Koskimaki might explain the matter so that there is no wrong impression left on the transcript? Of course, I have no objection of Mr. Anthony cross-examining on it.

THE COMMISSIONER; Well, Mr. Koskimaki?

WITNESS KOSKIMAKI: If we can

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1 refer to the table on page 17 of 8-B-1.4 of the
2 exhibit, the upper part of the table shows --

3 MR. GENEST: Will you just
4 hold on till we all find it, Mr. Koskimaki? It's
5 8-B under -- that's the second red tab and there's
6 a pink tab 1 and there's a white tab 4, and page 17
7 of that is where the table appears.

8 WITNESS KOSKIMAKI: O.K.,
9 the upper portion of that table shows noise levels in
10 eight octave bands ranging between 63 hertz band
11 and the 8,000 hertz band. The lower part of the table
12 has a flat-weighted and A-weighted columns. The
13 flat-weighted is a logarithmic addition of those eight
14 octave bands that are listed, and they do not extend
15 beyond those frequency ranges. The A-weighted are
16 those same octave bands on an A-weighted scale which
17 discounts some of those bands more than others before
18 the addition takes place.

19 MR. ANTHONY: Mr. Commissioner,
20 may I be permitted just to get this point and two
21 others clarified?

22
23 HOYT PURCELL
24 GRAEME GEORGE KING
25 CARL M. KOSKIMAKI
26 MILTON E. HOLMBERG
27 JOHN T. McMULLEN
28 PATRICK ST. JOHN PRICE
29 KENNETH E. RATHJE
30 CAMERON M. REID, resumed:

CROSS-EXAMINATION BY MR. ANTHONY (CONTINUED):

Q As I understand it then,
both the flat-weighted and the A-weighted scale deal
with the same octave range as defined in the first

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

1
2 part of the table on page 17?

3 WITNESS KOSKIMAKI: Yes sir.

4 Q And then the A-weight
5 then discounts certain levels within that same range?

6 A Yes sir.

7 Q And the report that
8 you referred us to in your earlier testimony will define
9 which of those were correct to get to the A-level.

10 A Yes sir. That Section
11 17 of the Preliminary -- Section 7, rather, of the
12 Preliminary Station Design Report and it's explained in
13 detail how those were corrected for the A-weighted scale.

14 Q Thank you. I think that
15 clarifies that particular point for me. There were
16 two other points, one matter of getting something on
17 record, and the second just a matter of arithmetic,
18 that perhaps I could clarify for the record also.
19 The first one is questions I directed to Mr. Koskimaki
20 on page 3933 where I requested a catalogue of chemicals,
21 fuels and lubricants to be used, and I was wondering
22 whether, Mr. Koskimaki, you could provide the Inquiry
23 at a convenient time the catalogue of these chemicals
24 used, and lubricants to be used?

25 A Yes sir, I can do that.

26 Q And then I gather from
27 discussions with yourself and Mr. Genest that it would
28 be appropriate to ask questions on the storage and
29 handling of these chemicals and so on to either the
30 construction or operations and maintenance .

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Anthony

MR. GENEST:

That's correct.

MR. ANTHONY:

The only other issue I'd

like to get clarified is the matter of arithmetic that
Mr. Reid and I went through, and I think we have got
our figures sorted out, if nothing else, and I'd like
to just for the purposes of the record to go through
that with Mr. Reid to ensure that the record is
correct, and for purposes of reference, this discussion
starts at page 3985 and following in the transcript;
but I will deal with the major parameters and identify
them so that we have that information in a little more
precise form.

Mr. Reid, as I understand your
evidence, you start off with saying that your current
estimate of methanol requirements are 25 to 30,000
tons, is that correct?

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Anthony
Cr. Exam. by Bell

1 WITNESS REID:

2 A That is correct.

3 Q And converting that to
4 gallons, it was from six and a quarter to seven and a
5 half million gallons of methanol?

6 A Yes, sir.

7 Q And that to transmit that
8 methanol into the 25 percent solution that you required
9 for a test fluid, you would require from
10 eighteen and three-quarter to twenty-two and a half
11 million gallons of water?

12 A Yes, sir.

13 Q Which then gives a total
14 of between 25 to 30,000,000 gallons of test fluid?

15 A Correct.

16 Q And I believe your evidence
17 was also that to dilute that test fluid to a one
18 percent solution suitable for discharge, you would have
19 to multiply the total solution by 25, which my
20 calculation comes from 625,000/⁻⁰⁰⁰to 750,000,000 gallons
21 of water, is that correct?

22 A That's correct, yes.

23 MR. ANTHONY: That's fine. Thank
24 you, Mr. Commissioner.

25
26 CROSS-EXAMINATION BY MR. BELL:

27
28 Q Mr. McMullen, good morning.
29 I have a couple of questions to ask you about the
30 communications system which has been described in your

1 evidence, and perhaps I could inform the Inquiry
2 that in the exhibits to its application, Arctic Gas
3 describes two arrangements which would satisfy its
4 communication requirements for the operation of the
5 pipeline.

6 And one arrangement is one where
7 the applicant would design, build, own and operate
8 the microwave system for the operation of its pipeline,
9 and the other arrangement, the alternative one is
10 one where the applicant would lease its required
11 communications needs from the common carrier in the
12 area.

13 Now, I would like to look a little
14 closer at the first arrangement. Perhaps it would
15 help if I just put a couple of sentences on the record
16 here. This is Exhibit number 54, Tab number 8.b.7
17 at page 2, and the second last paragraph reads as
18 follows:

19 "To achieve the reliability
20 and quality of communications services
21 required to operate the pipeline, the appli-
22 cant believes it essential that a system be
23 available to it under one of the following
24 two arrangements. Arrangement number one:
25 The applicant will design, build, own and
26 operate a microwave system along its pipe-
27 line, and all or an adequate number of
28 channels on the system will be dedicated to
29 the applicant's exclusive use.

30 Channels in excess of the

1 applicant's requirements could be made
2 available to common carriers, so that they
3 could provide service to northern commu-
4 nities."

5 I would like to know, Mr.
6 McMullen, are you responsible for designing the system
7 which is envisaged under this arrangement?

8 WITNESS MCMULLEN:

9 A Yes, I am.

10 Q Can you tell me, will there
11 be designed into this system, excess channels which
12 could be made available to common carriers to provide
13 service to communities along the route?

14 A By the nature of the system,
15 there are excess channels.

16 Q Can you tell us approxi-
17 mately how many?

18 A There are approximately
19 from one, it's a 300 channel system, and as you saw
20 in the presentation, the cross-sections used in the
21 Territories, the largest one is 66 channels, so there
22 is a significant amount of excess channels.

23 Q And will these excess
24 channels also be available to accommodate further
25 expansion of the gas pipeline?

26 A Yes. But we don't expect
27 that the communications requirements would grow more
28 than 10 percent of the number of channels shown.

29 Q And will they also be
30 available to accommodate the needs of an oil pipeline

1 or a railway, should they be built?

2 A I beg your pardon?

3 Q Would these excess
4 channels be available to accommodate the needs of an
5 oil pipeline or a railway, if they were to be built?

6 A I believe that in order for
7 sharing between two companies to take place, that
8 there must be an arrangement, an intermediate arrange-
9 ment for a common carrier involved in the agreement.

10 Q So that if another mode
11 of transportation were to require communications
12 facilities, they would have to make an arrangement
13 which might include the applicant, but would also
14 have to include a common carrier?

15 A That's right.

16

17

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29

30

Purcell, King, Koskimaki, Holmberg,
McMullen, Price, Rathje, Reid
Cross-Exam by Bell

1
2 Q The applicant states
3 elsewhere in its application that a fair amount of
4 secondary activity will follow the construction of the
5 pipeline.

6 MR. GENEST: Where is this,
7 Mr. Bell? I'd like, if a quotation is being put,
8 Mr. Commissioner, I would like to ask my friend that
9 the exact quotation be put.

10 MR. BELL: Well, I'm afraid
11 I don't have it exactly available, Mr. Genest. Per-
12 haps I could rephrase the question then.

13 Q Would these excess
14 channels be available to accommodate the needs result-
15 ing from any secondary activity or population influx
16 which might be generated by the pipeline?

17 WITNESS McMULLEN: This is a
18 similar case to the first one where there would have
19 to be an arrangement with the common carrier.

20 Q And did I understand you
21 to say just now that the applicant would require
22 approximately 66 channels for operation north of the
23 60th Parallel?

24 A In the presentation on
25 communications, there were several cross-sections shown.
26 This particular one, 66 channels is between the 60th
27 Parallel and Fort Simpson,

28 Q Well, can you tell us
29 then how many channels altogether the applicant would
30 require north of the 60th Parallel?

Purcell, King, Koskimaki, Holmberg
McTullen, Price, Rathje, Reid
Cross-Exam by Bell

1
2 A In each section of the
3 system?

4 Q Well, if that's the
5 way it works, yes.

6 A Typically between the
7 60th Parallel and Fort Simpson it was 66 channels.

8 Between Fort Simpson and
9 Norman Wells it was 54 channels.

10 Between Norman Wells and
11 Inuvik it was 42 channels.

12 And between Inuvik and the
13 Alaskan border it was 30 channels.

14 Q Is it fair to add that
15 up as a total of 192?

16 A No, those are not
17 accumulative, as a matter of fact the circuit assign-
18 ment is that 12 circuits are dropped at Fort Simpson,
19 12 at Norman Wells, and 12 at Inuvik, and there are
20 30 that come in at the 60th Parallel, leave the
21 Territories at the Alaskan border.

22 Q Well let me understand
23 this. Suppose that we had an unusual situation and
24 everybody who had access to one of these channels wanted
25 to call Calgary or Edmonton at the same time. Would
26 they need 192 channels, or would they just need only
27 66?

28 A These channels that we
29 are speaking of here are dedicated to the pipeline.
30 In order to -- for other parties to use the system,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bell

1
2 the microwave system, there must be other channels
3 established on it for their use.

4 Q Well, I'm still not sure
5 whether that answered my question or not. Suppose if
6 there were no other parties who wanted to use the lines,
7 or the channels, I guess "lines" is not correct, never-
8 theless if the maximum use were to be made at any one
9 time of the needs of the channels available, would it
10 then be fair to add them up to 192?

11 A No.

12 Q Well, how do the people
13 in the delta, the employees of the applicant, contact
14 the head office, at the same time as the people in
15 Fort Simpson?

16 A 12 of the channels that
17 we were speaking of are assigned to Inuvik, was it,
18 in the delta?

19 Q M-hm.

20 A They are assigned to
21 Inuvik. Those 12 channels are -- go to Calgary. They
22 cross the 60th Parallel. Now there are 12 channels
23 assigned to each one of the district offices at Norman
24 Wells and Fort Simpson, as well.

25 Q So that if -- I'm afraid
26 the arithmetic has got me a little confused. So it
27 would not be possible then for everybody who wanted
28 to call to make a call, they would get a busy signal,
29 is that what you're telling me?

30 A No sir.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bell

1
2 Q Well, I'm still not clear
3 then as to the relationship between the 12 channels that
4 would be dedicated and the 12 channels at Fort Simpson.

5 A There are 12 channels
6 assigned to Fort Simpson

7 Q O.K., well what was the
8 54 that you told us about earlier?

9 A That is the cross-
10 section, or the thickness of the channels, the number
11 of channels in use between -- what is that, that's
12 Fort Simpson and Norman Wells.

13 Q I take it that none of
14 these channels would require access to the public
15 network?

16 A That's correct.

17 Q But under arrangement
18 No. 2, which is the lease situation, they would all
19 require access to the public network?

20 A No sir, they would be
21 leased from the common carrier and they would be
22 private circuits, carried on the common carrier
23 system.

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1 Q Now I understand that the
2 two arrangements that we have been discussing, the
3 owned and operated arrangement and the leased arrange-
4 ment, they would apply only to the operation of the
5 pipeline, is that correct?

6 A That's correct.

7 Q But they would not apply
8 to the construction period? Those two arrangements
9 would not be available to the applicant, a choice of
10 those two arrangements would not be available to the
11 applicant? He would have to rely primarily on the
12 public microwave network during construction?

13 A During construction there
14 can be a similar arrangement between -- or a similar
15 choice between a private system and one leased from
16 the common carriers.

17 Q Well perhaps I could refer
18 you again to Exhibit number 54 at the same tab, 8.b.7
19 at page 4. It says

20 "Communications requirements
21 during the construction phase differ sub-
22 stantially from those needed for the rout-
23 ine operation of the pipeline. Voice and
24 data traffic initiated by the construction
25 crews, contractors, inspectors and other
26 personnel, and directed to distant locat-
27 ions will be carried primarily via the
28 public switch network."

29 A Yes, sir.

30 Q And I suppose any secondary

1 demand, if I can call it that, would also have to rely
2 on the public network for its -- to satisfy its
3 communication requirements?

4 A I think the word primarily
5 there means primarily over the public switch network.
6 The second aspect means there are private communications
7 systems possible.

8 Q Can you tell me how many
9 channels the applicant would require during the peak
10 construction period? That would be the winter of the
11 third year, the third winter?

12 A The cross-sections that
13 can be shown that are necessary to handle the con-
14 struction phase are similar in magnitude to the ones
15 for operation.

16 Q Won't he require a lot
17 more lines, a lot more -- well there will be more
18 people making more communications. Wouldn't that
19 suggest that his needs would increase over the
20 operation period, at least they would be greater than
21 the operation period?

22 A It is slightly greater
23 than the operation period.

24 Q I understand that at each
25 construction spread camp, there are plans to provide
26 about seven pay phones for the private use of the
27 employees stationed at that camp?

28 A Yes, this is what we
29 envisaged in the specifications.

30 Q And these pay phones will

1 be the only means of voice communication from the camp
2 by those employees?

3 A Yes, for the ordinary work-
4 ing man. Of course, supervisory personnel will have
5 possibly other access through the business phones.

6 Q For their private use?

7 A But for their private use
8 there would be the pay phones.

9 Q I gather that at each of
10 the construction spread camps there will be about 800
11 people living there?

12 A Yes, that's --

13 Q Are seven pay phones really
14 enough to provide adequate service to 800 people?

15 It seems to me sir, that
16 if even half of these people want to call home on
17 Sunday, there's going to be a tremendous line-up at
18 those phones.

19 A That is possible at
20 times.

21 Q Well what I think I am
22 suggesting to you is that the applicant is going to
23 need more than seven pay phones, a lot more than seven
24 pay phones at each camp, and that in order to satisfy
25 the needs of the people at that camp, that the number
26 of channels which you will require will increase
27 accordingly?

28 A The number of channels are
29 not proportional to the pay phone, the number of pay
30 phones. The number of channels that you assign or

1 determine from pay phones depends on the traffic load
2 that the pay phones carry. Now, in a construction
3 camp what will probably happen is that the people
4 coming off shift will be making phone calls; between the
5 changes in shifts there will not likely be too many
6 phone calls made from the pay phones.

7 Therefore, that will tend to
8 balance out with for instance, the people using the
9 business phones, so that you can see there will not
10 be a proportional increase in the number of long
11 distance trunks when we look at the number of pay
12 phones, because you have to balance it out with all
13 of the other communications services that are being
14 used from the camp as well.

15 Q I see. Do you have any
16 traffic pattern projections for the construction period?

17 A Yes, we do.

18 Q Are they available to the
19 Inquiry?

20 A They are ⁱⁿ the specification.
21 The basic assumptions in the traffic patterns are
22 given.

23 Q Can you direct me to that
24 document?

25 A I am not certain of the
26 number of -- given to the document.

27 MR. GENEST: Is that Volume 8?

28 WITNESS MCMULLEN:

29 A It is called "Communications
30 Services Required During Construction of the Arctic

1 Gas Pipeline". March, 1974.

2 MR. BELL:

3 Q Thank you. Just a few
4 more questions. I understand that during the operation
5 period and under arrangement number one, the owned-
6 operated arrangement, the applicat would require a
7 number of transmission and repeater stations along
8 the route, or in the vicinity of the route?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bell

1 A Yes sir.

2 Q And these stations would
3 consist of a tower with a receiver-transmitter of some
4 sort, plus a power source, is that correct?

5 A Yes, that's correct.

6 Q And in some cases there
7 would also have to be a helicopter pad for access by
8 the maintenance crew.

9 A Yes.

10 Q Can you tell me how many
11 such stations would be required north of the 60th
12 Parallel under arrangement No. 1?

13 A Just one moment. Arran-
14 gement No. 1, there will be 55 permanent sites required
15 and 12 temporary sites.

16 Q And are you the person
17 who recommended the location and placement of these
18 stations?

19 A Yes.

20 Q Are you familiar with
21 the location known as Bear Rock? B-E-A-R.

22 A Yes, I believe that's
23 the one that's just north of the Great Bear River.

24 Q Right, and one of these
25 stations along with a heli-pad is going to be located
26 on Bear Rock.

27 A Yes.

28 Q Well, can you tell me if
29 it would be feasible to locate the station somewhere
30 else?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bell
Cross-Exam by Bayly

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4 questions.

5 THE COMMISSIONER: Thank you,
6 Mr. Bell.

7
8 CROSS-EXAMINATION BY MR. BAYLY:

9 Q Mr. McMullen, while we're
10 on the subject of communications, it just occurred to
11 me while Mr. Bell was cross-examining you that you
12 can't make a direct distance call from a pay phone,
13 as I understand, is that correct?

14 A That's correct.

15 Q And so that if seven
16 phones were in use at the same time, that would require
17 seven operators, I take it.

18 A It would require an
19 operator to handle each call. I don't know how many
20 operators it would require to handle the seven phones.

21 Q All right, but there would
22 have to be an operator assisting each call, even if a
23 single operator could assist more than one call at one
24 time.

25 A Yes.

26 Q I wonder if you could
27 explain to me this channelling method, from what I
28 understand from Mr. Bell's cross-examination of you
29 that it appears that no matter how many calls are
30 being made, the channels are never used up.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Mr. Bayly

1
2 A I am not certain I
3 understand your question.

4 Q All right.

5 A I think if you're looking
6 at a 300-channel microwave system, the actual number
7 of voice channels that that can carry depends on the
8 multiplex assignments which are imposed on the micro-
9 wave system.

10 Q Which means that more than
11 one call can go on a single channel because they are
12 staggered, as you showed in your slide, is that
13 correct?

14 A Which type of channel are
15 you referring to now?

16 Q Well, you were showing
17 us a slide with the voice signals being mixed so that
18 they were not -- it did not appear that they were all
19 on the same channel, and you suggested that more could
20 be carried, just in that fashion rather than
21 assigning a single voice communication to a single
22 channel; is that correct?

23 A A voice channel as we
24 see it, carries one conversation at any given time.
25 There cannot be two voice channels -- pardon me, two
26 voice conversations on one voice channel simultaneously
27 When we talk about a radio system which has a capacity
28 for many voice channels, then the number of voice
29 channels that are actually carried by that system
30 depends on the number of -- or the multiplex scheme

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 that you impose on it. Now that multiplex scheme has
3 a number of voice channels associated with it. Now
4 they may have an assignment similar to what we were
5 talking about between Fort Simpson and Calgary. Now
6 those 12 voice channels assigned there means that
7 there can be 12 simultaneous conversations between

8 Q:
9 Fort Simpson and Calgary, /And at the same time other
10 calls going from Fort Simpson to other places on
11 other channels, is that correct, or on the same
12 channel?

13 A If there were
14 'Other channels assigned
15 to other places, they could be carried simultaneously.

16 Q What you're telling us
17 then is that you have designed a system to your satis-
18 faction that won't be overloaded, given the number of
19 uses you anticipate for it because you have assigned
20 from one place to another place sufficient channels
21 to handle what you think will be the load in those
22 areas; is that correct?

23 A That's correct.

24 Q Dr. Purcell, if I could
25 direct some questions to you, please. You stated
26 in your cross-examination by Mr. Gibbs, and perhaps I
27 could refer to the volume, page, and Mr. Genest can
28 supply you with that. It's Volume No. 30, and it's
29 page 3775. Have you got the page, sir?

30 WITNESS PURCELL: Yes sir.

Q Now, starting approximately
line 18, in fact I should go back to line 14, the

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

question, and I'll read the question:

"Prior to the printing process that resulted in Exhibit 54, were there any changes made in your design by the client, or did he accept each time your recommendations?"

And your answer was:

"I could be wrong, but I think our designs were pretty much accepted and what most of the discussion centred about was the way to express them in the application, the words that went into the application."

Now, with specific reference to the question of looping of the pipeline, I wonder if you could supply us with information as to whether this was actively contemplated and recommended by you prior to the preparation of Exhibit 54?

A I had another question from Mr. Gibbs that asked if we had considered looping and I replied to it that we had never been instructed by Canadian Arctic Gas to proceed with plans for looping. That's true today as well as prior to the preparation of the application.

Q I realize that, sir, but could you refer then to page 3776?

A Yes sir.

Q Wherein your answer starting at page 3 -- I'm sorry, at line 3, you refer to looping being deferred rather than looping not occurring at all.

Purcell, King, Koskimaki, Holmberg,
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

A That's correct.

Q Now did you make any recommendations as to whether looping would in all events have to occur, or did you not make that kind of recommendation to Arctic Gas?

A The kind of information we would have provided to Arctic Gas would have included the maximum volumes that could be carried in a given line size before looping was required.

Q All right, so in other words you supplied that information and any conclusions arising out of that information would have come from Arctic Gas, is that correct?

A The conclusions would have been obvious, I think, to both of us.

Q All right, so when Arctic Gas refers to looping not being contemplated in a 48-inch line, in the application, that would be a conclusion that they drew from the information that you had supplied them with, is that correct?

A I don't think that you can make that kind of conclusion.

Q All right, well let's refer then to Exhibit 54, 8-B-12, page 1 and page 4. Now, if I refer you to the paragraphs following the tables in configuration and design, that's past the pink tab, now these pages I'm afraid aren't numbered but it is the fourth page and the heading of the page is:

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

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"Expansion for projected through input increases."

MR. GENEST: I'm sorry, Mr.

Bayly, what tab?

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1 MR. BAYLY: Tab 8.b.1. Point 1,
2 and it is the fourth page although it doesn't have
3 any number.

4 MR. GENEST: Right. It's headed
5 "Summary of Compression Equipment Requirements"?

6 MR. BAYLY: No, expansion for
7 projected throughput increases.

8 MR. GENEST: Oh yes.

9 MR. BAYLY: Have you located that,
10 sir?

11 MR. GENEST: Follows table 2.

12 MR. BAYLY: Yes.

13 Q Now in that first para-
14 graph, about half-way down, the following is written,

15 "The two 48 inch gas supply
16 lines from Prudhoe Bay to Richards Island to
17 Travaillant Lake can accommodate volumes
18 approximately twice as large as those proj-
19 ected for the fifth operating year by the
20 installation of additional compression equip-
21 ment along the lines. This additional
22 capacity precludes the need for the install-
23 ation of additional pipe (looping), as gas
24 volumes increase beyond the fifth year
25 level, thus minimizing the future disturbance
26 and environmental impact of the expansion".

27 That, sir, suggests to me that
28 a conclusion has been reached that looping would not
29 be required with those 48 inch lines?
30

1 WITNESS PURCELL:

2 A The conclusion that I think
3 the applicant intended to convey was that he could
4 accommodate much larger volumes before it was neces-
5 sary to loop. I don't think the applicant intended
6 to say that he would never loop that section of the
7 pipe.

8 Q All right. So the word
9 "preclude" should be something like "defers".

10 A Yes, preclude for the
11 near term perhaps.

12 Q Yes. And so where that
13 sort of reference is made to precluding the need for
14 looping, it's more reasonable to assume it means
15 preclude for the short term?

16 A Yes sir, or defer.

17 Q Or defer. In your
18 opinion, using a 48 inch line, rather than a 42 inch
19 line, what would be the difference in the deferral
20 of the need for looping?

21 A It would depend upon the
22 rate at which the gas volumes increased. The gas
23 volumes that are shown for the fifth year are two and
24 a quarter billion cubic feet per day. A 42 inch line
25 would accommodate up to three and a quarter cubic
26 feet per day, and a 48 inch line up to four and a
27 half billion cubic feet per day.

28 Q All right. So it's really
29 the southern end that would determine this, is it,
30 the need for the gas rather than the supply, because

1 I assume the supply can be left there if it isn't needed,
2 until it is needed?

3 A The decision to increase
4 the gas volumes would depend upon the supply being
5 available, and the market being available to absorb
6 it.

7 Q All right. Now, let us
8 assume that the gas supply is available, and that the
9 need increases at the rates projected. Can you give
10 us some idea of for how long looping could be deferred
11 with a 48 inch as opposed to a 42 inch line?

12 A No sir, I can't. I haven't
13 been given those numbers and we haven't made studies
14 of that nature.

15 Q So we would just have to
16 look at the size of the line and its capacity, and
17 since there are no forecasts available, there is no
18 term of years you can give us? All we can say is that
19 it probably would be longer.

20 A It would definitely be
21 longer. I can't tell you how much longer.

22 Q All right. I would like
23 to go onto the spacing of compressor stations, Dr. --

24 THE COMMISSIONER: Excuse me,
25 Mr. Bayly. Before you do, you say that the 48 inch
26 line can accommodate four and a half billion cubic
27 feet. That takes us to the fifth year, doesn't it?

28 A We were speaking of the two
29 supply lines, and in the fifth year each supply line
30 supplies one half the volume, so for the supply line,

1 for example, from Prudhoe Bay to Travaillant Lake,
2 the fifth year volume is half of four and a half, or
3 two and a quarter.

4 Q But is that the maximum
5 volume of gas that you can transport through each of
6 those lines?

7 A No, sir. There are two
8 compressor stations installed on the Prudhoe Bay
9 line to accommodate those volumes. I believe there
10 are ten compressor station sites, so to increase
11 the flowing volume you would have to install more
12 compression equipment at the other sites.

13 Q And that means that you
14 increase the volume of gas that you transport through
15 the pipe?

16 A Yes, sir.

17 Q Now, what is the maximum
18 amount of gas that you can transport through a 48 inch
19 pipe? Before you reach the -- what is that amount?

20 A With all the compressor
21 stations in service it's about four and a half billion
22 cubic feet per day.

23 Q And after that, if you want
24 to transport more gas, leave supply and demand out of
25 it, if you want to supply more -- transport more gas,
26 you have to loop?

27 A You have to loop. You can
28 get a slight increase by adding compression, but you
29 normally I think would start to loop before you did
30 that.

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1 Q So four and a half billion
2 cubic feet is essentially all that you can transport
3 through a 48 inch line?

4 A That fills up one line, yes,
5 sir.

6 Q And --

7 MR. GENEST: I don't know whether
8 you want me to help at this stage or not sir, but
9 perhaps it might clear up things as -- my understand-
10 ing is that as the supply from the two supply legs
11 reach the capacity of the main line, any further volume
12 in the supply legs would require looping of the main
13 line, so you would be looping the main line before you
14 looped the supply lines.

15 THE COMMISSIONER: Yes. And
16 once you are transporting four and a half billion
17 cubic feet in the line from Travaillant Lake south,
18 then you have reached your maximum. You cannot bring
19 any more gas south of Travaillant Lake without loop-
20 ing?

21 A That's correct, yes, sir.

22 Q And just so that there is
23 no misunderstanding about this, given these projected
24 volumes that appear in the tables, on the two pages
25 preceding the page that Mr. Bayly was reading, is
26 the fifth year annual volume of gas to be transported
27 from Travaillant Lake south, the maximum volume?

28 A Yes, that is the full
29 volume of the 48 inch pipeline south of Travaillant
30 Lake.

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1 Q And in your work, was there
2 any assumption that looping would occur after the fifth
3 year, or was the matter simply left on the basis that
4 it wouldn't be necessary to project what the require-
5 ments would be beyond the fifth year?

6 A The latter, sir.

7 THE COMMISSIONER: Thank you, and
8 thank you, Mr. Genest.

9 MR. BAYLY:

10 Q Just following that up,
11 Dr. Purcell, that would mean that every compressor
12 station site would have a compressor station on it
13 by that point, at the end of the fifth year, assuming
14 that the volumes were being put in at the source?

15 A South of the Travaillant
16 Lake Junction, that's true.

17 Q Yes.

18 A Yes, sir.

19 Q And when you say that
20 adding compression doesn't significantly change the
21 amount of gas that can be put through the line,
22 does that mean because of the compression up to which
23 you are allowed to go, given the size and wall thick-
24 ness and strength of the pipe, that you cannot add
25 compression beyond that 1,600 and some pounds per
26 square inch?

27 A No sir, you can add more
28 compression, and it has the effect of reducing the
29 suction pressure and the discharge pressure does not
30 change.

1 The suction pressure is reduced
2 if more gas is flowing through the pipe.

3 Q And the compression --

4 A It's not a terribly
5 economical way to operate. It uses a lot of fuel.
6 It's more desirable to start looping before adding
7 compression, but compression could be added first.

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Purcell, King, Koskinaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 Q Using the amount of
3 compression that you project, the maximum economic
4 amount of compression, you're burning I believe it's
5 something like 7% of your fuel in operating the pipe-
6 line, and beyond that you're burning even more if you
7 add more compression; is that correct?

8 A That would
9 be correct, yes sir.

10 Q Now on the subject of
11 compressor stations, Dr. Purcell --

12 A It's Mr. Purcell, Mr.
13 Bayly.

14 Q Sorry, Mr. Purcell, --
15 MR. GENEST: Mr. Purcell,
16 actually, like the English composer.

17 MR. BAYLY: Is it, Mr. Purcell?

18 A One change at a time.

19 Q I'd like to talk to you
20 about compressor stations, if I could. You stated in
21 the evidence that you gave that the spacing of
22 compressor stations would not be altered if the
23 applicant decided to use a 42 rather than a 48-inch
24 line, is that correct?

25 A We use the same sites
26 for both sizes of pipeline.

27 Q Now when you say you
28 use the same sites, you therefore use the same inter-
29 val between compressor stations, is that correct?

30 A Yes sir.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

Q Now if I could refer you
to something that's puzzling me because of that, it's
in Volume 8-A-2, page 4 -

A 8-2?

MR. GENEST: 8-A-2 is a map.

MR. BAYLY: I'm sorry, 8-B-2.4,
or page 4, not .4, this is in a section called:

"Station horsepower and spacing."

Have you got it?

A Yes sir, I have it.

It's Section 8-B-1.2,

Q Page 4.

A Page 4.

Q Now, referring to that
page, there is an item:

"The following major equipment was selected
for the purpose of this initial design,"
close to the top of the page.

A I have it.

Q Now the first paragraph
talks about 48-inch supply lines and the average
station spacing for optimum volumes being 45 miles,
given the size of the equipment and the kind that you
would anticipate using.

A That's correct.

Q And then going into the
second paragraph No. 2, talking about 42-inch delivery
lines, now this is at different temperatures and
pressures, I understand, or at least different

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 temperatures,

3 "The average station spacing for these 42-inch
4 lines for optimum volumes of 63 miles."

5 Is that correct?

6 A That's correct.

7 Q Now, can you explain why
8 for a 42-inch line at conventional pressures the
9 difference is 63 miles, and for a 48-inch it's 45
10 miles, and why in light of that you would anticipate
11 using the same sites, whether you used a 42 or 48-inch
12 line?

13 A There are several things
14 that explain the difference between 45 miles and 63
15 miles. One is that the flowing temperature of the
16 gas is higher in the southern end of the system, and
17 an increase in flowing temperature increases the
18 horsepower requirement per mile. The second major
19 difference is that the optimum volume, the volume
20 at which the cost of service is at a minimum, for the
21 42-inch line it's 2.7 billion cubic feet a day and
22 for the 48-inch line it is 4 1/2 billion feet per
23 day. I think those are the two main things that
24 are different between the chilled 48-inch station
25 spacing and the cooled 42-inch station spacing.

26 Now a third factor that
27 serves to reduce the optimum volume as you reach the
28 southern end of the system is that fuel gas becomes
29 more valuable, becomes more expensive because you have
30 to transport it all the way through the northern part

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 of the system to reach the southern end. That has the
3 effect of making horsepower more expensive and there-
4 by reducing the amount of horsepower that you would
5 put on the system.

6 Now the second part of your
7 question was, why is the station spacing on the 42-
8 inch line not 63 miles also?

9 Q That's correct.

10 A And I think the two
11 things that are different there now are the fact that
12 the flowing temperature in the north is much lower and
13 that allows less horsepower to be used. On the other
14 hand, the optimum volume is higher, partly because of
15 the lower flowing temperature and partly because of
16 the lower fuel cost. Now, to be honest with you,
17 when we were asked to look at the 42-inch alternative
18 we were asked to keep the same station sites as we had
19 in the 48-inch if it did not significantly affect
20 the economics of the situation, and we determined that
21 it did not. So I think in fact the 42-inch alternative
22 application states that we have not optimized the
23 size of the station for the 42-inch line. We feel that
24 would be more appropriate at this late date to wait
25 a little bit longer and wait until we have designed
26 gas volumes when the transportation contracts are
27 completed.

28 Q Then Mr. Purcell, if I
29 were to say to you that one of the concerns of people
30 in say the Aklavik region was that a compressor

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 station was placed close to the west channel and a good
3 fishing spot, you would say then that it actually
4 could be moved, given your last answer. It could be
5 moved a significant distance, I don't mean 20 or 30
6 miles necessarily, but it doesn't have to sit in that
7 particular spot. You were given those sites, you
8 used them and determined that the economics didn't
9 change significantly by keeping those original sites,
10 if the line is to be 42 rather than 48 inches.

11 A Well, first I hadn't
12 heard any concern that -- about the location of that
13 site. Second, we do have some flexibility, that's been
14 discussed in the application and by Mr. Dau. We can
15 move the station slightly. I think the most important
16 thing to make clear is that we need to look at the
17 feasibility of moving each station on an individual
18 basis.

19 Q All right.

20 A It's impossible to give
21 a generalized answer to the question.

22 Q I notice Mr. King
23 shaking his head as though he didn't necessarily agree
24 with you. I wonder, Mr. King, if you had anything you
25 wanted to add to that answer?

26 WITNESS KING: I was having
27 a side discussion with Mr. Koskimaki.

28 Q Oh, I see. I'm terribly
29 sorry.

30 MR. GENEST:

He was asking if he was
going

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 to pay for lunch.

3 (LAUGHTER)

4 THE COMMISSIONER: Asking
5 if he thought they would get the plane tomorrow.

6 MR. BAYLY: That may be my
7 fault.

8 Q Now one of the things
9 you referred to in your last answer, Mr. Purcell, was
10 with regard to transporting gas at higher temperatures
11 that requires a larger amount of horsepower.

12 WITNESS PURCELL: That's
13 correct.

14 Q And therefore it burns
15 more of the gas that's being transported, I assume;
16 is that correct?

17 A Yes, although remember
18 that the chilling horsepower also burns gas.

19 Q Yes.

20 A It requires a large
21 amount of compression horsepower is what I should have
22 said.

23 Q Is there much difference
24 in your opinion in transporting chilled and unchilled
25 gas in terms of the amount of energy required to
26 transport them?

27 A I don't have that at
28 my fingertips, Mr. Bayly. We tend to look at these
29 things in terms of the total cost of doing it the two
30 ways.

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Bayly'

1
2 Q Yes. The reason I asked
3 that is in the previous panel, I believe it was Dr.
4 Clark, stated that he didn't think there was anything
5 significant in the difference of transporting chilled
6 or non-chilled gas. It was suggested to him that you
7 could transport more gas more cheaply if it were
8 chilled than if it were at conventional temperatures.

9 A Yes sir, I remember that.

10 Q And so you don't have
11 any figures that would suggest that --

12 A No, I spoke to Dr. Clark
13 and those were my figures that he was talking about.
14 Your question had to do with the fuel consumption.

15 Q That's correct.

16 A Under the two modes, and
17 that's what I don't have at my fingertips. What I
18 am familiar with is the total cost of transporting
19 gas in the chilled mode against the cooled mode.

20 Q And what are the compari-
21 sons there?

22 A As far as the compressor
23 station cost goes, there appears to be about a 5%
24 advantage in transporting gas in the chilled mode.
25 And the compressor station costs are about 30% of
26 the project costs. Now I don't think that's a
27 significant difference because there are different
28 pipeline costs that could overwhelm that difference.
29 There could be a different cost of steel for the
30 pipe under the two flowing temperatures, depending on

1
2 who you buy pipe from. There would be different costs
3 of weighting, there could be different costs for
4 suppressing frost heave, and things of this nature,
5 and those estimates are very difficult to get at
6 because of the difficulty in predicting frost heave
7 before the ditch is opened.

8 Q And which
9 of the pipes would be cheaper, the pipe to transport
10 chilled gas or conventionally temperatured gas?

11 A If there is a difference,
12 which some mills have said there isn't, the pipe to
13 transport chilled gas would be somewhat more expensive,
14 not a great amount.

15 Q All right. Have they
16 suggested that there is something that has to be added
17 to the steel in the pipe, or some method that has to
18 be used that would be different?

19 A We have two specifications
20 for mainline pipe in this volume. The one that would
21 be used for the chilled part of the pipeline has a
22 lower design temperature of minus ten degrees; and the
23 one for the cooled part of the pipeline has a lower
24 design temperature of plus 25 degrees.

1 Q Yes.

2 A And that is the difference
3 that's reflected by the pipe manufacturers.

4 Q I realize that in a temper-
5 ature way, I'm assuming that means that something
6 different has to be done to the pipe when it's manu-
7 factured. Maybe Mr. Holmberg --

8 A I hope so.

9 Q -- can supply me with some
10 information on that.

11 WITNESS HOLMBERG:

12 A The pipe for the lower
13 temperature has to have a lower transition temperature,
14 and that is achieved principally by the controlled
15 rolling process that they use in manufacturing the
16 pipe. This is to accomplish a smaller grain size.

17 Now this controlled rolling
18 really amounts to finishing the rolling at a lower
19 temperature. This requires more powerful equipment,
20 and a mill that has the capability of doing this,
21 it doesn't cost them a whole lot more to make the
22 lower temperature pipe than it does the pipe that could
23 be rolled at a slightly higher temperature.

24 But if a mill does not have that
25 capability, it does penalize them and this is the main
26 reason that there's a difference between the different
27 mills.

28 Q They want you to pay for
29 the machinery if you want the pipe made that way, I
30 understand?

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1 A That's probably right, of
2 course the mills also want the business.

3 Q Thank you, sir. With regard
4 to the compressor stations again, why was the deter-
5 mination made to have unmanned rather than manned
6 compressor stations? Do you have that answer, Mr.
7 Purcell?

8 WITNESS PURCELL:

9 A When we designed the stat-
10 ion, I don't think we were too concerned about whether
11 people would be there or not. We simply followed
12 what are the latest design techniques in compressor
13 stations, and that is equipment can control the station
14 more efficiently than a human being can.

15 So we've installed equipment so
16 that it's not necessary for people to be there watch-
17 ing dials and constantly adjusting knobs to keep the
18 station operating safely.

19 Q Now, we saw a picture, I
20 think it was Mr. Koskimaki's picture of a compressor
21 station, and the compressor station site with gravel
22 and concrete pad, seemed to be much larger than the
23 station itself, and I wonder if Mr. Koskimaki can
24 give some explanation of why so much area is needed
25 for an apparently small station?

26 WITNESS KOSKIMAKI:

27 A There is two reasons for
28 that. One of the reasons, origi_nally when we laid
29 out those station sizes, it was thought that the
30 entire pad would be required for the construction camp

1 of the pipeline. The second reason was to provide
2 room for future expansion should the pipeline ever be
3 looped.

4 Now, the -- since that time I
5 understand that the area necessary for the construction
6 camp is thought to be much lower than it originally
7 was, so that studies are being made presently to see
8 if we can reduce the amount of gravel at those
9 stations and perhaps put that extra gravel in in the
10 future, should it ever be looped rather than putting
11 it in originally.

12 But those studies, I don't think
13 a decision has been made on that/^{so}we were still using
14 the original assumptions.

15 Q So this is contemplated
16 and this would change, not only the size -- possibly
17 change not only the size of the compressor station
18 sites, but would also perhaps change the gravel
19 borrow requirements?

20 A Yes, sir.

21 Q Now, I noticed in your dia-
22 gram as well, sir, that there was a fence and you
23 stated that the fence was one of the things that you
24 had to put in because of government regulation. Is
25 there a special reason why it's twelve feet high?

26 A No. Actually, we hadn't
27 given much thought to the height of the fence. We
28 showed it because it was required, but the actual
29 design of the fence hasn't been done yet.

30 Q Mr. Purcell, perhaps you

1 can answer this. If there were a site that was found
2 to be environmentally sensitive, or socially significant,
3 and a compressor station was located on or near that
4 site, would it be possible to use two compressor
5 stations, say two smaller compressor stations to avoid
6 that site? For example, say it were a denning area
7 or something that covered more than the size of the
8 compressor site. In other words, so that the deter-
9 mination might have to be made whether or not to move
10 the site several miles?

11 WITNESS PURCELL:

12 A That would be possible.
13 Those could be moved. I haven't heard of a case where
14 that's the case.

15 Q All right, but I'm just
16 -- I'm giving you a hypothetical. I'm not suggesting
17 that there necessarily is one, but it could be done
18 in that fashion?

19 A Yes sir, it could.

20 Q If we could discuss now
21 these arresting bands, and I would think that these
22 questions perhaps might be appropriately answered by
23 Mr. Holmberg.

24 Now these bands, you stated in
25 your evidence, were to be placed approximately every
26 300 feet, is that correct, sir?

27 WITNESS HOLMBERG:

28 A Yes.

29 Q Now I --
30

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1 WITNESS PURCELL:

2 A Excuse me, Mr. Bayly. That
3 was not in our evidence. In response to a question
4 from Mr. Gibbs, I said that it hadn't been determined,
5 and when he pressed me, I said that my guess would be
6 it would be on the order of 300 feet.

7 Q All right. Let's leave it
8 then as a guess of approximately 300 feet. Is that
9 I gather an educated guess? You think that would be
10 an appropriate sort of distance, even if it turned
11 out to be 500 or 200 feet. We are dealing in hundreds
12 of feet rather than 300 feet or three miles?

13 A Yes sir. That is essent-
14 ially the length of pipe that can be repaired in
15 a minimum time. Any shorter lengths of pipe could
16 not be repaired more quickly. Now there's a slight
17 -- there's a slight increase in danger from a break
18 300 feet long versus one 200 feet long. If you happen
19 to be standing in the extra 100 feet. If that does
20 happen to become an important consideration, then that
21 could have the effect of shortening the spacing.

22 Q All right. Now, I won't
23 pin you down to a particular length, but let's assume
24 that 300 feet were the length. And given that the
25 length of the pipeline is projected to be 2,629 miles,
26 I did some multiplication which suggested that you
27 would need 35,200 of these arresting bands. I don't
28 expect you to do that multiplication, but it appears
29 that there will be a large number of these bands, and
30 it looks like it's about 35,000 of them.

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly.

1 Now, the question arising out of
2 this, is what sort of a surcharging effect will this
3 number of a thousand pound bands have on the pipe?
4 Has this been studied?

5 A Could you be more specific.
6 What do you mean by surcharging?

7 Q All right. Surcharging,
8 and this is, as I understand it from a previous panel,
9 is weighting the pipe to keep it from rising up because
10 of things that the soil and the ice may do to it.

11 Now, we heard from Mr. Holmberg
12 that these collars or bands would weigh about a thous-
13 and pounds apiece. Now, every 300 feet or so, there
14 would be a band weighing a thousand pounds. Now, you
15 may not know the answer to this, but do you know
16 whether or not the effects, the surcharging effects of
17 these bands have been studied?

18 A These bands we described
19 were made out of pieces of pipe, so they have about
20 the same weight as a piece of pipe,

21 Q Yes.

22 A And we're speaking about
23 putting on four extra feet of pipe every 300 feet,
24 so it would increase the total weight of the pipe
25 by slightly over one percent.

26 Q I realize that --

27 A I don't think that that
28 extra weight has been taken into account in the pre-
29 liminary estimates of concrete weights and surcharging,
30 because I don't think those estimates are accurate

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1 to that degree.

2 Q All right. So you're
3 suggesting that it's a smallweight, but that it may
4 not have been studied because the actual weights
5 haven't been refined to that extent?

6 A Yes, sir that's correct.

7 Q Now, I gather that these
8 bands would be installed in the shop, is that correct?

9 A That would be -- that's my
10 opinion.

11 Q Now, would the installation
12 of these bands inhibit field bending?

13 A No sir, it would not. They
14 would be put on the end of the piece of pipe that is
15 not normally bent.

16 THE COMMISSIONER: Excuse me.
17 How long are the lengths of pipe?

18 A A minimum of 40 feet,
19 approximately.

20 Q And the -- so that you
21 would have about eight lengths of pipe before you
22 reached your arresting band?

23 A Yes, sir.

24 Q Then would the band be
25 placed on the pipe where two lengths of pipe are
26 joined, or would it be placed on the pipe in the
27 middle of the length?

28 A I think the best way to
29 do it would be put it right at the end or very near
30 the end of a joint of pipe. Far enough away from

1 the weld so that it didn't cause any problems in field
2 welding, but not in the middle because that would
3 probably cause problems in bending the pipe.

4 Q Because when you bend the
5 pipe, you do it so that the bending, where it imposes
6 the maximum stress, occurs in the middle of the length
7 of pipe? Have I got that right?

8 A Pretty much so, yes. The
9 pipe is bent along most of its length, if it's a large
10 bend that they are trying to make, but it's not bent
11 right at the end, because it has the effect of deform-
12 ing the end of the pipe and making it difficult to
13 weld.

14 Q The bending that goes on
15 in the field, does it occur before or after the lengths
16 are welded?

17 A It occurs before.
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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 MR. BAYLY: I am just wonder-
3 ing whether anybody on this panel could give some
4 answer to that last question that I had on the sur-
5 charging effect. Is there anyone that was involved in
6 any of the test sites that might have done some work
7 on this? I'm wondering, Mr. Commissioner, if Mr.
8 Genest would have any objection to my asking this
9 question to perhaps Mr. Williams, if he's coming back
10 for the construction panel?

11 MR. GENEST: What's the nature
12 of the question, Mr. Bayly?

13 MR. BAYLY: It's with regard
14 to the surcharging effect of these arresting bands
15 and whether this was studied at any of the test sites.

16 MR. GENEST: I'll try and get
17 that information. Mr. Williams may not be the source
18 but I will try and get it.

19 MR. BAYLY: All right.

20 Q Now you've discussed
21 these field bends in response to the Commissioner's
22 questions and I understand that the bends will be
23 close to the middle of the pipe rather than at the
24 ends. Will there be any problems with wrinkling in
25 field bends of any great degree?

26 WITNESS PURCELL: No, if the
27 pipe is wrinkled during the field bending process,
28 it's discarded, and as Dr. Price explained the other
29 day, an internal device is put in the pipe during
30 bending so that it can be bent safely without the

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 danger of wrinkling.

3 Q I'm going on to
4 pipe supplies and suppliers. I think it was you, Mr.
5 Purcell, who said that the pipe could be supplied by
6 some of the suppliers with a one-year advance ordering
7 time; is that correct?

8 A Yes sir.

9 Q Would that mean that an
10 individual firm could supply all the pipe that was
11 needed within that one year, or would you have to get
12 pipe from several different firms in order to make that
13 one year?

14 A I think it could be
15 theoretically possible to get all the pipe from one
16 firm. I don't think that anyone contemplates getting
17 all the pipe for this project from one firm.

18 Q And if the pipe could
19 be made within one year, would you order only enough
20 per year for what was going to be constructed in the
21 next year, or would it all be ordered at once and be
22 ready at one time?

23 A Mr. Bayly, I'm not very
24 familiar with the logistics planning for the pipeline.
25 I think the next panel would have that at hand.

26 Q All right, may I hone
27 it down then to your area of expertise? When you
28 gave your answer that you felt that the pipe could be
29 ordered and prepared, within a year, does that mean
30 all the pipe or the pipe for a single construction

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 season?

3 A No sir, that again was
4 my estimate of the amount of time that a person would
5 want to place an order for pipe before he started
6 receiving pipe, and it allows for previous commitments
7 the manufacturer might have as well as getting the
8 materials ready to make the pipe, and making test
9 runs of pipe so that we know it meets the specifications

10 Q I see, so that's before
11 you start receiving any pipe.

12 A Yes. Now again the
13 logistics people could speak to this more specifically,
14 I think, than I can.

15 Q All right. Now the pipe
16 was from the various firms, were graded by Arctic Gas
17 as being preferable or not so preferable. Would it
18 be contemplated to use the more -- the pipe from the
19 most preferable firms in areas where you would anti-
20 cipate the greatest likelihood of problems, or would
21 the pipe be mixed, or do you know that?

22 MR. GENST: Mr. Commissioner,
23 I know Mr. Marshall, I think, had a run at this which
24 was not too successful, and perhaps you'll forgive me.
25 Again if I raise the matter, I don't anticipate Mr.
26 Bayly as going very deeply into this, but it creates
27 problems. It seems to me, sir, that that is a National
28 Energy Board matter. ^{If} We are going to get some evidence
29 about the ranking of manufacturers, Canadian versus
30 foreign suppliers. It's not of much help to get into it

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 in a light manner and getting into it with a set
3 piece presentation of evidence is really, in my
4 respectful submission, not within the terms of reference
5 of your lordship's Inquiry.

6 MR. BAYLY: Mr. Commissioner,
7 my only concern is that are there going to be some
8 areas that are going to have to put up with pipe
9 that isn't as good as some other areas will get, and
10 that may be a concern of people in specific areas?
11 There may be no answer to that at this present, and
12 I would suspect that would be the case; but it may be
13 something which is a concern of this Inquiry.

14 THE COMMISSIONER: Well --

15 MR. BAYLY: If breaks, for
16 example, are contemplated as a possible impact of
17 the pipeline, then something with regard to the quality
18 of the pipe may be significant. I realize that you
19 don't want to necessarily get into it to the depth
20 that the Energy Board will; but the quality of
21 equipment is a concern.

22 THE COMMISSIONER: Well, I
23 think that having allowed the matter be explored in
24 Mr. Gibbs' cross-examination, for limited purposes,
25 related as I recall to the question of the quality of
26 the steel to be used in the pipe, its liability to
27 fracturing, and the results of fracturing and the
28 impact on the environment^{if} fracturing occurred, in
29 view of that I think I will allow Mr. Bayly to do it,
30 but I think we'll have a cup of coffee first.

(PROCEEDINGS ADJOURNED FOR FEW MINUTES)

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. BAYLY:

Q Mr. Purcell, before we broke for coffee, I had begun to question you about pipe and whether pipe from certain mills would be contemplated for use in certain areas. Now, because I don't want to get into things that are the concern of the National Energy Board, I might rephrase that question. Would it ^{be} possible, in your opinion, to get sufficient pipe for the entire project from the milling companies that are preferable, in your opinion? Perhaps Mr. Holmberg could comment on that.

WITNESS HOLMBERG:

A There are several things that determine whether or not -- how much pipe a mill can furnish. One is as Mr. Purcell mentioned is their prior commitments. Also, as far as purchasing pipe, on a big project such as this, it's usually desirable to get pipe from more than one source, so that you're not purely at the mercy of one mill. There is always the possibility of breakdowns in equipment and things of that type which could result in serious delays.

So it's desirable, generally, to obtain pipe from several mills. I'm not sure that I understand your question with respect to getting a year's supply from a single mill or the entire project's requirement in a single year. I'm a little

1 hazy on just what you're driving at there.

2 Q Let me ask you this then,
3 Mr. Holmberg. Would it be necessary, in order to
4 meet construction schedules, to take pipe that you
5 were less satisfied with than it would if construct-
6 ion schedules were spread over a longer period of
7 time?

8 A No, I don't think that
9 would be necessary, and I don't think it would be
10 desirable, or anyone would tolerate that type of
11 thing.

12 I would like to call your attent-
13 ion to the fact that in the specifications we actually
14 require that the mills make a prior pre-production
15 run on pipe, demonstrating that they can make pipe
16 that will meet the specifications, and this will be
17 done, and there will really be ^{very} little difference in
18 the quality of the pipe from one mill to the other.

19 Now, one mill may be more capable
20 or a little better prepared, better equipment, so that
21 they can more readily make a -- make the pipe, and
22 have possibly fewer rejections, or fewer problems,
23 make a better rate of production and one thing and
24 another. And these -- in this respect, one mill may
25 be more desirable than another.

26 Q Fine. Then would I be
27 right in assuming that where penalty would be paid
28 for poor pipe would be at the hydrostatic testing
29 stage where poor pipe would show up its defects, if
30 there were any?

1 A Actually prior to hydro-
2 static testing there's a large amount of inspection
3 work and testing done. The steel plate itself is
4 tested to make certain that it will have the desired
5 mechanical properties.

6 During the course of production,
7 the manufacturers themselves do a large amount of
8 inspection. There'll be non-destructive tests made on
9 the welds, such as X-rays or ultrasonic testing, and
10 finally the mills themselves make a hydrostatic test
11 on the pipe before it's shipped.

12 Q Then the first tests that
13 Arctic Gas would make would be subsequent to shipping,
14 that
15 is that correct? The tests/would be made prior to
16 shipping would be manufacturers' tests?

17 A That's right.

18 But it would -- I should point
19 out that there will be inspectors representing Arctic
20 Gas in the pipe mill, checking on these tests and
21 making a final inspection of the pipe, independent
22 of the mill inspectors.

23 Q Thank you. I wonder if
24 there is somebody on the panel, and perhaps it would
25 be you, Mr. Purcell, who could explain to the Inquiry
26 the differences between source and cap gas?

27 WITNESS PURCELL:

28 A I don't think any of us
29 are what you would call experts in that subject.

30 Q Can anyone give a general
explanation of the differences?

1 A Could you be referring
2 to solution gas rather than source gas?

3 Q It may be, I have been given
4 the term "source gas". If that doesn't mean anything
5 to you, perhaps if there is a difference between
6 solution and cap gas, you could --

7 A My understanding is that
8 solution gas is the gas that's entrained in the oil
9 as it's produced, and it's separated from the oil in
10 surface facilities and the two are transported
11 separately. Cap gas is a reservoir of gas that lies
12 on top of the oil and is essentially free of oil.

13 Q Yes, those were the differ-
14 ences that I had anticipated. Well then let's call
15 that, -- what was the term that you used?

16 A Solution gas?

17 Q Solution gas. Now, in
18 projecting the volumes that would be derived from the
19 various areas, that is Prudhoe Bay and the Delta, is
20 it true that a large proportion of the Prudhoe Bay
21 gas that forms the reserves there is solution gas?

22 A I don't know, sir.
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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 Q This isn't an area you are
3 familiar with?

4 A Yes, supply studies are
5 carried out directly by CAGSL, not through Northern
6 Engineering.

7 Q All right, now with
8 regard just in a general way, is it true that solu-
9 tion gas must often be pumped back into the ground
10 to enable the pressure to be maintained to bring the
11 oil up?

12 A The producers, I am sure,
13 or I know are planning to reinject the gas that's
14 separated from the oil prior to the time the gas
15 pipeline comes into operation. After that I am ignorant
16 of what the procedure is.

17 THE COMMISSIONER: The
18 producers where, Prudhoe Bay?

19 A Yes sir, at Prudhoe Bay.

20 MR. BAYLY: Q Now this, I
21 understand, is not necessary with cap gas which can
22 be taken off and put directly in to a pipeline before
23 the oil is extracted, is that correct?

24 A I think we're over our
25 heads, Mr. Bayly.

26 Q Are you? O.K., I notice
27 Mr. King -- was this a conversation on this subject?
28 Are you worried about the --

29 MR. GENEST: I will have to
30 instruct Mr. King about his facial expressions.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 MR. BAYLY: This wasn't
3 on that subject?

4 May I assume then,
5 Mr. Commissioner, that we will at some point be able
6 to find out which gas would be ready to be put into a
7 pipeline directly, and which gas would not be ready
8 and might have to be pumped back, and the reason I
9 ask that question is because of the tables we have,
10 I am questioning whether or not the availability of
11 Prudhoe Bay gas will be retarded and delta gas will
12 have to fill the pipe for the first period of time,
13 which might mean that more delta gas would have to
14 go into the pipe than is contemplated in my under-
15 standing, anyway, at present.

16 THE COMMISSIONER: Well,
17 originally the construction schedule was for the first
18 two years, would be used to develop the line to the
19 Mackenzie Delta and the mainline south, and the third
20 year, the Prudhoe Bay line. Has that been changed?

21 MR. GENEST: Not to my -- well,
22 the years are changing as these processes are going
23 on.

24 THE COMMISSIONER: Yes.

25 MR. GENEST: But the relation-
26 ship, as I understand it, Mr. Commissioner, is that
27 delta gas will go into that pipe at least one year
28 before Prudhoe Bay gas.

29 WITNESS PURCELL: That's correct,
30 yes.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
~~Coss~~-Exam by Bayly

1
2 THE COMMISSIONER: I think what
3 you're asking is whether the delay in bringing the
4 Prudhoe Bay gas on is owing to the nature of the
5 gas to be extracted at Prudhoe Bay?

6 MR. BAYLY: That's correct, sir, yes.

7 MR. GENEST: Well, I think I
8 can find that out, sir. I think Mr. Horte knows this,
9 he's expert in that subject.

10 MR. BAYLY: Perhaps we can
11 ask him then.

12 THE COMMISSIONER: I hope
13 someone is making a list of all the things that we
14 will be discussing with Mr. Horte.

15 MR. GENEST: We are sir, yes.

16 MR. BAYLY: Now in the dis-
17 cussion of corrosion, and here I am at a loss and didn't
18 find in the transcript who had answered this question,
19 the only area that was contemplated as a problem with
20 regard to corrosion was the Beaufort Sea Coast, the
21 North Slope of the Yukon and Alaska; was that you, Mr.
22 Rathje?

23 WITNESS RATHJE: Yes. No
24 that's not correct. That statement was referring to
25 atmospheric corrosion.

26 Q Yes, this is what I
27 meant. This was the area where atmospheric corrosion
28 was contemplated as presenting more problems than in
29 any other area; is that correct?

30 A Possibly more problems,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

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2 simply because of the sea atmosphere in that area.

3 Q Yes, I understand that
4 things rust more quickly with the sea air in that
5 region, is that correct?

6 A Yes, that's usually true.

7 Q Would it be necessary
8 because of that to treat that pipe in a different way
9 from the pipe for the mainline from Travaillant Lake
10 south?

11 A No sir, the pipe will be
12 buried and therefore this has no effect other than
13 perhaps structures on the station, and the same type
14 of procedures would be used regardless.

15 Q My concern, sir, relates
16 to stockpiling, and you may not be able to answer this
17 question, we may have to wait till another panel, but
18 assuming that pipe is to be stockpiled for a period of
19 time before it's put into the ground, I would guess that
20 it would be subject to a certain amount of rusting
21 during that period. Would that be a fair statement?

22 A Yes, and in such areas
23 where we thought there would be a problem we would have
24 an external coating applied to the pipe which would either be
25 easily removable or which would be compatible with the
26 final coating, or alternatively, is that it would
27 be a final coating.

28 Q All right, so in that
29 sense you would contemplate treating this pipe perhaps
30 differently from pipe used where sea air would not

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 be a problem, is that correct?

3 A Yes, only if we thought
4 there was a problem.

5 Q And I haven't asked but
6 perhaps you have some information on how long this
7 pipe would be likely stockpiled before introduction
8 into the ground.

9 A No, I don't have that
10 information.

11 THE COMMISSIONER: By sea air
12 you're talking about salt air, are we?

13 MR. BAYLY: That's what I
14 understood by "sea air", yes sir.

15 A Yes sir.

16 Q Now, have you done any
17 work on the kinds of coating that this would be? From
18 the sound of it it appears to be something other than
19 a plastic bag. It appears to be something that's
20 actually applied to the pipe.

21 A Yeah, for the external
22 coating for the north we have selected two kinds of
23 coatings. One is a polyethylene tape coating which is
24 a tape, and it's wrapped around the pipe. The other
25 is a fusion bond epoxy coating which would be applied
26 probably at the pipe source.

27 Q Which one of these --
28 I gather it's the second -- which would be used as
29 the final coating rather than the tape, which I
30 suppose could be removed.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

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2
3 A Preferably where we
4 thought we would have a problem due to atmospheric
5 corrosion, either in storage or in transit. This would
6 be the preferred type of coating, yes sir.

7 Q Now, does the coating
8 that you contemplate having on the inside of the pipe
9 suffer from these corrosion problems, and would it
10 have to be especially treated for the salt air?

11 A No sir, it would be an
12 acceptable coating for that type of atmosphere.

13 Q How would you protect
14 the ends where you have stated the coating won't
15 reach because that area must be free so that the weld
16 can be made on metal without any other contaminants?

17 A They could be capped
18 over or some kind of coating which would be readily
19 removable.

20 Q Now when you say "they
21 could be", has it been contemplated that they will be
22 or is it just a suggestion that you thought up?

23 A No, it's just one of
24 the things that we have considered and a lot of these
25 questions will come into final design.

26 Q So this hasn't been
27 determined yet?

28 A That's correct.

29 Q Mr. Purcell, with regard
30 to the paper that you presented on buried as opposed
to above-ground facilities you spoke about people

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 hunting and perhaps hitting the pipeline and that
3 would not be a problem with steel of this gauge; but
4 you did refer to problems with deliberate acts of
5 man, and these were not gone into. I just wonder what
6 you would contemplate as being that kind of a problem?

7 WITNESS PURCELL: It would be
8 possible to damage the pipeline above ground more
9 easily if a person wanted to do it.

10 Q All right, would you
11 be contemplating people with bulldozers building roads
12 or this sort of thing?

13 A That wouldn't be what
14 you'd call deliberate damage. That would be in the
15 accidental damage category.

16 Q I see.

17 A It would be a fatal act
18 on a bulldozer.

19 Q Beg your pardon?

20 A It would be a fatal act
21 on a bulldozer.

22 Q From what you have said
23 earlier I can see that. I'm a little concerned about
24 --

25 THE COMMISSIONER: Excuse me.
26 I visited the site in Ontario near Kingston, where
27 Trans-Canada was looping the Trans-Canada Gas Pipe-
28 line last fall, and they -- we visited a compressor
29 station that they had had nearby, an accident of the
30 very kind you've described, and I don't recollect

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 anyone saying that there had been a fatality, but would
3 you mind telling me a little more about the -- what
4 would occur if a bulldozer were to collide with the
5 pipeline?

6 A If it were to rupture
7 the pipeline, the pipe would fail between the arrester
8 bands, if there were such things, on an above-ground
9 pipeline. The gas would be released under tremendous
10 pressure. The pipe would probably behave wildly, as
11 I described in that paper I read.

12 Q Yes?

13 A And most likely there
14 would be a fire resulting from the release of the
15 gas.
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Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1
2 Q Well, the gas -- I hope I
3 am not anticipating some other panel, but since you
4 seem to know about this, maybe you could tell me a
5 little more about it. Is there likely to be an explos-
6 ion?

7 A No sir, the gas would just
8 burn.

9 Q Now, what would lead to
10 the gas catching on fire? What would cause that?
11 Why wouldn't it simply dissipate into the air? It's
12 still in its gaseous state, I --

13 A My understanding, Mr.
14 Berger, is that the -- some of the gas in the air
15 would condense. It would change from gas to liquid
16 droplets in the air, and associated with this is a
17 release of static electricity. This is the best
18 explanation we have for the fact that a rupture will
19 ignite, will burn.

20 Q So the --

21 A It could also be ignited,
22 of course, by the bulldozer ignition or electrical
23 equipment if the bulldozer were the cause.

24 MR. BAYLY:

25 Q Now, Mr. Purcell, I would
26 gather that this is the kind of problem that could
27 occur in a looping situation. I'm not thinking of
28 deliberate in the sense of somebody setting out to
29 destroy the facility, but I'm thinking of the bull-
30 dozer type of accident.

1 A we were talking about
2 above ground pipe.

3 Q Yes, I'm still --

4 A And now you're talking --
5 you're still talking about above ground pipe?

6 Q Yes, I'm thinking of the
7 rationale for burial rather than above ground facil-
8 ities, and I'm assuming if you're looping, it's safer
9 to have buried pipe because you don't run into it
10 with the equipment?

11 A That's right, it's well
12 protected by frozen ground.

13 Q Right. Now this whipping
14 effect sounds very visually -- and another way is
15 dramatic. What stops that from occurring, at least
16 to some extent with a buried facility, if it's only
17 buried, say, four feet below the ground? Is there
18 not likely to be something like that with a rupture
19 of a below ground facility?

20 A No sir, I would think not.
21 The frozen ground is enormously strong, and in cases
22 the pipe -- in fact I think it's been suggested that
23 once the ground is frozen, it could practically carry
24 the gas pressure without the pipe. It's enormously
25 strong.

26 Q Now, what about in an area
27 of discontinuous permafrost, where say a rupture
28 occurred in an unfrozen part? Can you give us some
29 idea of the effect on the unfrozen ground?

30 A We're speaking north of

1 the 60th parallel?

2 Q Yes.

3 A When we run a pipe through
4 unfrozen ground, we very rapidly freeze it. We form
5 a large frost bulb around the pipe.

6 Q I realize that.

7 A So that would have the same
8 effect of adding a great deal of mass and restraint to
9 the pipe that would keep it from behaving that way.

10 Q Your feeling is that the
11 frost bulb would be large enough to recreate the
12 continuous permafrost type of situation and the very
13 stable ground?

14 A Through most all of the
15 discontinuous zone I think that's true, yes, sir.

16 Q All right. So that would
17 mean that the frost bulb would be quite large and
18 able to restrain the pipe in that way, is that
19 correct?

20 A The frost bulb and the
21 surrounding soil, yes.

22 Q Mr. Koskimaki, in your
23 discussion on sound, as I understand it, and I'll use
24 your numbers, but I'll also use the examples you
25 gave because they mean more to me, outside a com-
26 pressor station we would be right outside it at the
27 level of 70 dcb, is that correct? Approximately?

28 WITNESS KOSKIMAKI:

29 A The actual numbers that
30 are calculated vary a little bit, somewhere between

1 65 and 68 or so.

2 Q All right, and that's quite
3 a loud noise, because the way you described it is a
4 vacuum cleaner in a living room with you or a
5 television on, is that correct?

6 A I think it's slightly below
7 the level which you would call loud, but it is probably
8 a level that causes annoyance.

9 Q All right. Now, when --
10 perhaps we have different tolerances of loud. I
11 understand though that what you mean by loud is loud
12 painful, like a rock band at 10 feet or something
13 like that?

14 MR. GENEST:
15 To some people that's a
16 joy.

17 A It's still quite a bit
18 below what would cause pain to the ear.

19 MR. BAYLY:

20 Q All right, but do you define
21 loud as something that is above annoyance, but below
22 pain?

23 A Something like that.

24 Q I think I understand the
25 area we're in. Now, It takes about a thousand yards
26 to
27 for it/drop down to 50?

28 A At a thousand feet.

29 Q A thousand feet, I'm sorry.

30 A Now that would be only true
if it's a hard surface for that thousand feet which
would reflect all of the sound back into the air in

1 a hemispherical manner.

2 Q Yes.

3 A If there is shrubbery or
4 grass or trees around the station, this level gets
5 reduced to about 50 dba in more like 300 feet rather
6 than a thousand feet.

7 Q All right. Given the
8 design of the compressor station you've showed us on
9 the diagram, I would assume that the sound would have
10 uninterrupted progress, at least as far as the fence?

11 A Yes, that's true.

12 Q And you've described the
13 50 level as a suburban level of noise. I'm not quite
14 sure what that is.

15 A It's, 50 dba would be
16 approximately the level that you would find around
17 a suburban area at night. It's a limit that was set
18 because it was found that when noise levels are at
19 approximately 50 dba, well there is no annoyance
20 calls from residents complaining about the industry
21 close by or something like that.

22 Q So above 50, people start
23 to complain?

24 A Well at night probably
25 that's true. In the daytime, you would probably be
26 above that, so that daytime annoyance levels are
27 higher than night time.

28 Q All right. So a thousand
29 feet away from this thing, if you were used to sleep-
30 ing in a suburb, you could sleep say in a tent without

1 complaining?

2 A I think that's true, yes.

3 Q I'm just trying to put this
4 into sound terms that I can understand.

5 Can you give us some idea of the
6 sound levels that exist presently on the route in areas
7 which are not inhabited? I would assume that they
8 would be below 50, for example?

9 A Well, it depends on how
10 hard the wind is blowing, for instance. Wind through
11 the trees could cause that much noise.

12 Q So wind through the trees
13 could go up to 50 dba?

14 A Well, I don't have the
15 exact figures for that on what would be the limits
16 in case there is high winds or something, but back-
17 ground noise has been recorded at around that level.

18 Q Now, in this thousand feet,
19 we've dropped from 70 to 50. Is this a direct
20 straight line rate of drop or is there some sort of
21 curve to the grade of drop? Does it suddenly drop to
22 50 at some point or --

23 A No, it's pretty much a
24 straight line drop.

25 Q Now some people have said
26 that sound travels very far in very cold air, rather
27 than in warmer air.

28 A Yes, sir, that's because
29 the amount of attenuation you get from the absorption
30 of the sound level, or sound energy in the molecules

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Bayly

1 in the air drops almost to nothing when you get below
2 zero, so that the -- we made calculations for both
3 summer and winter temperatures because of that, and
4 in one, we just eliminated the air absorption altogether
5 for winter calculations. And in the summer, we used
6 the lowest ones -- it varies with humidity also, and
7 it's much higher at 10 percent humidity than it is at
8 90 percent, so we used the levels that were around
9 90 percent humidity, which would be the worst case.

10 Now, in the wintertime, you have
11 a certain benefit because the condenser fans can be
12 turned off, and therefore you eliminate the noise from
13 the fans and you eliminate one of the electrical
14 generators, so the overall effect is that the summer
15 and winter noise levels are approximately the same.

16 Q Because you are using less
17 equipment in the wintertime?

18 A Yes.

19 Q Now was this testing that
20 you did, was this -- I'm sorry, you called it a cal-
21 culation, and that brought to mind that this was not
22 a field test, but taking a table or a formula and
23 developing it, given certain temperatures and certain
24 humidity levels. Would that be correct?

25 A Yes sir, the methods of
26 calculation are more or less proven methods. They've
27 been used throughout the industry and it's not really
28 new technology or something like that.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

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2 MR. BAYLY: Alright, and assuming Mr.
3 Commissioner, that Mr. Genest will have people going
4 into this more thoroughly in the air portion of a
5 later phase.

6 MR. GENEST: I just can't
7 tell you right now, Mr. Bayly

8 MR. BAYLY: Well, Mr. Marshall
9 told us that about two days ago.

10 MR. GENEST: I think that's
11 right. If Mr. Marshall said it, it must be right.

12 MR. BAYLY: O.K.

13 THE COMMISSIONER: He's a man
14 we all rely on.

15 MR. BAYLY: Now the last
16 area of questioning I have is on the methanol solution,
17 and as I understand it from your evidence in chief and
18 on cross-examination, the amount of methanol which would
19 not be recovered but which would be released into the
20 water system would be around 1%, is that correct,
21 Mr. Reid?

22 WITNESS REID: The amount of
23 methanol which would be released not necessarily into
24 the water system, the eco-system, would be about 2%
25 of the total quantity.

26 Q 2% of the total quantity?

27 A Yes sir.

28 Q And is it possible that
29 this amount can be reduced in some way, or is that as
30 low as you can make it?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

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2 A I would say that it
3 could be reduced.

4 Q All right, I'm not going
5 to go into the suggestions of the Department of the
6 that
7 Environment that suggests / may be too high, but you
8 think it can be reduced. How much?

9 A I couldn't really say
10 how much it could be reduced.

11 Q O.K., can you give us
12 some idea how much it could be reduced? Could it be
13 cut in half, or can you give us some idea of the
14 method you would use to reduce it?

15 A One of the methods used
16 -- that could be used to reduce it is to put the
17 residue, which contains the 1% methanol, into a pond
18 or something like that, a contained pond; methanol
19 is highly biodegradable and it is very volatile,
20 evaporation and biodegradation would reduce the
21 methanol to nothing in a very short time, I would think.

22 Q All right, I understand
23 that if it did get released into a water system,
24 it takes a tremendous amount of water to deal with the
25 methanol so that it doesn't take a lot of oxygen out
26 of the water; is that a fair statement?

27 A If we were to dispose
28 of the methanol solution into the water course we would
29 definitely choose a very large water course that could
30 handle the oxygen demands that the methanol would put
on the system.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1
2 Q Yes. Is it fair to say
3 that methanol puts a large oxygen demand on water?

4 A I think you would have
5 to speak in relative terms. The general question, I
6 would say, is not true. Methanol requires about 1 1/2
7 times its own weight in oxygen for total oxidation.

8 Q All right, well let's
9 just consider then in northern waters, are we dealing
10 with oxygen starved water or oxygen rich water?

11 A My information is that
12 the Mackenzie River is well oxygenated at all times
13 of the year.

14 Q And when you say "well
15 oxygenated", is that a general statement that you've
16 been given, or has it been developed into figures,
17 and how much of that oxygenation you would require
18 were you to discharge into the Mackenzie River?

19 A In a report I saw, they
20 used both the term "well oxygenated" and a quantitative
21 figure which I believe was 12 parts per million. In
22 the Mackenzie River that would mean that approximately
23 500 pounds of oxygen would be flowing past any given
24 point in the river at any one time.

25 Q All right now, I would
26 assume there would be places where you could not
27 discharge into the Mackenzie; if you were discharging
28 at all you would have to discharge into other water
29 courses which might be either richer or less rich
30 than the Mackenzie.

1
2 A Yes. We have stated in
3 the application that detailed study by project biologists
4 will be given to any water course which is selected
5 either as a water source or as a -- or potentially as
6 a disposal site, and therefore there would have to be
7 site specific information on any water resource that
8 was contemplated as a disposal site.

9 Q All right now, if you
10 put methanol solution into a settling pond, you say
11 it's very biodegradable. Could you tell us what it
12 turns into, what we're left with when it's degraded?

13 A The final products, I
14 believe, are carbon dioxide and water.

15 Q All right, now is this
16 something that happens quickly or slowly in still
17 water?

18 A I'm afraid I don't know,
19 sir.

20 Q All right, if I were
21 to suggest to you that oxygenation that is water
22 picking up oxygen, happens more rapidly and it picks
23 up more oxygen in flowing water than in still water,
24 would you agree or disagree with me?

25 A I have no knowledge on
26 which to base my assumption but I would tend to
27 agree with you.

28 MR. BAYLY:
29 All right. I won't go
30 any farther with that line of questioning. I assume
that that will come up again when we're discussing

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

1 water in more detail.

2 Those are all the questions
3 I have, thank you.

4 MR. SCOTT: Mr. Bayly is not
5 going to let me push him out of the way like last time,
6 because last time I took all his notes.

7 MR. GENEST: That's why your
8 cross-examination was so good.

9 MR. SCOTT: That's why it was
10 so long.

11 THE COMMISSIONER: Before you
12 begin, Mr. Scott, some of the questions that have been
13 asked have dealt with the possibility of looping. The
14 projected daily gas volumes to be transported through
15 the pipeline will in five years reach the maximum
16 carrying capacity of the mainline south from Travaillant
17 Lake. The two supply legs from Prudhoe Bay and Richards
18 Island have double the capacity of the mainline south
19 of Travaillant Lake, even if those supply legs were
20 42 inches in diameter and not 48 inches, and the
21 application is still one for two supply legs, each
22 48 inches in diameter, even if they were 42 inches
23 in diameter they would still together exceed the
24 capacity of the mainline 48 inches in diameter south
25 from Travaillant Lake. When Mr. Horte and his panel
26 give evidence, Mr. Genest, I would like Mr. Horte and
27 his colleagues to deal with the question of looping.
28 When we discuss looping we are talking about building
29 a second pipeline, a second gas pipeline, and I want
30 to know if it is intended that this should be a second

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Bayly

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2 gas pipeline built in five years, if one is built I
3 want to know whether that will mean that the right-of-
4 way will have to be wider. It will inevitably mean, it
5 seems to me, that there would be a renewal of construc-
6 tion activity in a significant scale. It might mean
7 that there would have to be additional compression
8 stations built, and it might have a significant
9 effect on the life of the pipeline. As I understand
10 it, the pipeline now will -- it is intended that the
11 pipeline will be the means of extracting gas for 20 years,
12 if a second gas pipeline is built after five years,
13 does that mean that the extraction of gas will be
14 only for a period of 10 or 15 years? These are all
15 questions of very great importance so far as the
16 impact of this project on the north is concerned, and
17 I've raised them now so that Mr. Horte and his colleagues
18 can deal with them.

19 MR. GENEST: I'm very grateful
20 sir, we are quite aware that that is an important
21 aspect and they will be prepared to deal quite fully
22 with that matter. I just might point out that perhaps
23 I'd be safer to let Mr. Horte deal with that, but my
24 understanding of the looping process is that it does
25 not initially involve the laying of an entire line.
26 It is done in 10 or 20-mile sections.

27 THE COMMISSIONER: Yes.

28 MR. GENEST: At each compression
29 station.

30 THE COMMISSIONER: I understand

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 that too, but perhaps my understanding is even more
3 limited than yours but eventually you get--

4 MR. GENEST: Eventually you get
5 a second pipeline, and they will deal fully with that,
6 sir. I had intended to.

7 MR. SCOTT: Mr. Commissioner,
8 perhaps in fairness to my friend, it should be said
9 that for our part we would be concerned not only with
10 the second loop, but any other loops that can reasonably
11 be contemplated in the life of the project; and also
12 I think in fairness to my friend so his witness will be
13 able to comment on it, we may consider calling
14 evidence respecting the looping potential, if I can
15 call it that, of the Foothills application so that the
16 extent to which looping on the two proposals may occur
17 can be directly compared. However, Mr. Genest will
18 be able to deal with that with his witness, Mr. Horte.
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1 CROSS EXAMINATION BY MR. SCOTT:

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3 Q Mr. Purcell, I would just
4 like to see if I understand the interaction between the
5 geotechnical people we saw last week and the design
6 people, and can I take a simple example, so simple
7 that it may not be applicable, and see if I under-
8 stand correctly?

9 If you were building, for example,
10 a large apartment building I take it that you would
11 hire soil engineers who would examine the site and
12 provide data as to the condition of the terrain, and
13 the weights it might bear and so on?

14 WITNESS PURCELL:

15 A Yes, sir.

16 Q And then following that,
17 that data would be taken by the structural engineers
18 and a design developed that responded to the problems
19 of the data?

20 A The structural engineers
21 would come in after the foundation engineers, before
22 they designed the foundation.

23 Q Yes. We'll put the found-
24 ation engineers first. They would take the data that
25 the soil engineers had developed, and prepare a found-
26 ation design that would respond to that data?

27 A Yes, sir.

28 Q Yes. And I take it that
29 that, in that kind of situation, would be the inter-
30 action between the soil engineers on the one hand,

1
2 and the foundation engineers on the other?

3 A Yes.

4 Q Yes. Well now I understand
5 from Mr. Gibbs' cross-examination of you, that in
6 your work, you were provided with certain information
7 or instruction by your client, Arctic Gas?

8 A Yes, sir.

9 Q And that included the
10 points of supply, the daily volumes, the gas com-
11 position, the points of delivery, the pipe size and
12 the specifications for the pipe?

13 A Yes, that's an extreme
14 list. There are a couple of examples you gave where
15 we did have considerable input.

16 Q Yes.

17 A In the area of pipe speci-
18 fications, Mr. Holmberg and our staff metallurgist
19 contributed to the development of the specifications.

20 In the area of determining the
21 pipe size, we provided quite a lot of information to
22 Mr. Horte and his friends, so that they knew the
23 economics of various gas volumes and various pipe
24 sizes. In fact, one of the reports we rely on is an
25 illustration of the kind of information we provided
26 so he could make an informed decision.

27 Q But in this case, I take
28 it Arctic Gas provided these instructions to you, or
29 your people, that is the design people and Arctic
30 Gas devised them jointly, as in the specifications

1 and perhaps the pipe size?

2 A Yes sir, that's correct.

3 Q And I take it that you then
4 designed a pipeline that met those requirements as
5 best you could?

6 A Yes sir, we did.

7 Q And as you told Mr. Gibbs,
8 you designed it so that it could be-- and I am quoting,
9 "Built and operated to transport gas at a minimum
10 unit cost"? As best you could judge it?

11 A I think Mr. Gibbs kept
12 getting confused between what occurred and what our
13 objectives were. Our objective was always to achieve
14 the minimum unit cost. In some cases, there were
15 overriding considerations that made that impossible.

16 Q Yes. Well, I am concerned
17 at the moment only with your objective, and I've
18 correctly stated it, have I not?

19 A Yes, sir.

20 Q And I take it from what the
21 geotechnical panel told us, that the result of your
22 design was that you gave them an instruction which
23 was to allow a differential frost heave of two and
24 a half feet maximum in a hundred feet of pipe length?

25 A No sir.

26 Q I'm sorry. Where did that
27 specification or instruction arise, arise from?

28 A The instruction that we've
29 given to the geotechnical people had to do with the
30 possible curvature of the pipe. The actual physical

1 dimension came from an illustration of the movement
2 under a certain geometry that that curvature would
3 provide.

4 Q Yes.

5 A The curvature is the
6 criterion, not the movement.

7 Q Well then, would it be
8 correct to say that you gave them, as an instruction,
9 a serviceable radius of curvature?

10 A Yes, sir.

11 Q And I take it that from
12 that radius, they devised a formula, two and a half
13 feet in a hundred feet of length, differential heave?

14 A I don't know if that came
15 from them or if that was done by Dr. Price.

16 WITNESS PRICE:

17 A I believe that calculation
18 I did as a simple, illustrative example.

19 Q I see. So then I would
20 have it this way, that the design people provided the
21 radius of curvature, it was reduced to an example,
22 that is two and a half feet over a hundred feet
23 differential frost heave, and that was -- and both
24 those things were provided to the geotechnical
25 panel, or the geotechnical people?

26 WITNESS PURCELL:

27 A No, that example was pre-
28 pared to give the people at this Inquiry primarily a
29 better feel for possible movements.

30 Q I see.

Holmberg, Purcell, King, Koskiamaki,
McMullen, Reid, Price, Rathje
Cr. Ex. by Scott

1 A We did not provide the geo-
2 technical people with any limits as to absolute pipe
3 movement.

4 Q I take it that to provide
5 them with the radius of curvature, is to provide them
6 with a limitation beyond which no curve should take
7 place?

8 A That's correct.

9 Q Yes. And I take it then
10 it became the function of the geotechnicians, as I
11 understand it, to having got a pipe designed by the
12 design people, having got a radius of curvature to
13 develop a way in which it could be put in the ground
14 and supported within those limits?

15 A That's true.

16 Q Well now, is it not fair
17 to say that this process, whereby you provide to the
18 geotechnical people the specifications of the pipe,
19 is one that is outside the traditional approach to
20 these matters?

21 A I think it's in excess of
22 what's normally done, yes, sir.

23 Q I take it that that the
24 normal interaction between soil engineers and design
25 people would be sort of the other way around, that
26 the soil engineers would say "Here's what we can
27 take, bearing in mind the nature of the soil. You
28 design something to fit it"?

29 A They have remedial measures.
30 They can increase the resistance of the soil to forces,

1 and we don't have that flexibility in the pipe, yes.

2 Q So would it be fair to say
3 that the expertise remains the same, but in essence,
4 they don't provide you with the data, you provide them
5 with the object and they decide how it can be placed
6 in the ground?

7 A Yes sir, I think that's
8 fair.

9 Q Well now --

10 MR. GENEST: I'm not clear on
11 what the record is going to show here. I don't under-
12 stand Mr. Scott's drift. Is he talking about a soil
13 engineer who doesn't know whether the soil is going
14 to have to bear a skyscraper, or a shack, because it
15 seems to me that we are into a semantic situation here,
16 and that --

17 MR. SCOTT: No, no, no.

18 MR. GENEST: -- I don't follow
19 the drift of it.

20 MR. SCOTT: I think, Mr. Commiss-
21 ioner, the point I was trying to make was that the
22 interaction, and it may be necessary that this should
23 be so, that the interaction between these two discip-
24 lines is rather different than in the typical engineer-
25 ing situation, and if that's -- that's the only point
26 I sought to make.

27 Is there any doubt about that,
28 Mr. Purcell?

29 A I think that's fair, Mr.
30 Scott.

1 Q Well now, let me come to
2 the subject of bending. I understand on the matter
3 of bending, that you provided, or that your people
4 provided to the geotechnicians, a radius of curvature,
5 and by way of assistance, you were able to devise an
6 example that would help us, if not them, that the
7 differential heave in permafrost should be two and a
8 half feet and no more over a hundred feet.

9 A That assuming a certain
10 geometry, that's an example of the movement that would
11 be allowable.

12 Q Well now, in devising the
13 radius of curvature, do I understand that you assumed
14 that the pipe would bend uniformly?

15 WITNESS PRICE:

16 A No, that's not true, sir.
17 In establishing this radius of curvature we
18 relied on the full scale tests, and these tests showed
19 that a wrinkle forms at a -- some critical
20 curvature. However, when a pipe is bent in the ground
21 due to frost heave, or some other cause, the curvature
22 would not be a constant curvature. It would vary
23 along its length. It would be a maximum perhaps at a
24 certain region and that is where the wrinkle would
25 form.

26 Q Well I take it then, that
27 it is true that you did not assume a uniform curvature
28 in devising this figure?

29 A No sir. This curvature
30 is based on a limiting of strain and it is independent

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 of shall we say the curvature on the other side of it.
2 I really don't quite understand your thrust there.

3 Q Well let me put an
4 example that I put to the geotechnical panel, and it's
5 the example of the pencil. You take a pencil that has
6 no deficiencies in it, has no nicks in it, and you try
7 to bend one end of it. It will bend, is that not so?
8 And it will curve along that bend. Is that correct?

9 A That is correct, sir.

10 Q And it will curve uniformly
11 along that bend?

12 A Not necessarily.

13 Q Most likely, if there are
14 no deficiencies or defects or inequalities in the
15 pencil?

16 A Well it depends how you
17 bend it, sir.

18 Q No but what makes it bend
19 non-uniformly?

20 A I think I am starting to
21 understand what you're getting at.

22

23

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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 THE COMMISSIONER: Excuse me,
3 Dr. Price, could you move that microphone a little
4 closer to you? We're anxious to hear everything you
5 say, and that will help.

6 A Before we go
7 on, Mr. Scott, is it -- are you trying to suggest
8 that we're going to have a discontinuity, or --

9 MR. SCOTT: No.

10 Q Let's just take this
11 example of the pencil. There is some flexibility in
12 that pencil just as there is in a pipeline, isn't
13 there?

14 A Correct.

15 Q Yes, and I suggest to
16 you that if you bend it at one end -- and we're not
17 talking about when it breaks, we're talking about
18 before it breaks -- if the pencil is of uniform
19 material without any defects or special qualities from
20 place to place, it will bend uniformly.

21 A O.K., sir, I accept
22 that.

23 Q Yes.

24 A The curvature perhaps
25 would not create constant curvature, but it would be
26 a smooth curve, is that what we have?

27 Q That's a relatively
28 uniform curve. Is that correct?

29 A That is correct, sir.

30 Q Now if you take that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 pencil and you cut out a piece of wood in it, you make
3 a notch, you've altered the uniform quality of the
4 pencil, haven't you?

5 A That's right.

6 Q I take it then if you
7 bend that pencil something will happen, it will break.

8 A You've introduced a
9 weakness there, that's correct, sir.

10 Q And I take it that the
11 result of introducing the weakness is to concentrate
12 the stresses at or near the place where the weakness
13 occurs .

14 A That is correct, sir.

15 Q And that means that the
16 pencil breaks, when stresses of a certain point are
17 achieved.

18 A That is correct.

19 Q Yes. Well now, I ask you
20 to envisage this situation which was approached by the
21 other panel. Envisage the pipeline as an object, let
22 us say, 30 feet in diameter being a frost bulb, with
23 an interior metal lining. Do you follow me so far?

24 A I'm with you, yes.

25 Q And I take it that that
26 is the way the pipeline, when it is chilled in the
27 ground, will in fact look. Isn't that so?

28 A That is correct.

29 Q And I take it that you
30 recognize that, as I think the geotechnical panel did,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 that the frozen earth and water will have points of
3 weakness in it.

4 A I imagine that would
5 be correct, sir.

6 Q Well now, what happens
7 when you attempt to bend not merely the pipeline but
8 the entire object of 30 feet in diameter? Is it like
9 the pencil with the notch in it?

10 A No, I don't think so,
11 sir. We've got two very different materials here.
12 The frost bulb itself can be considered as, shall we
13 say, a brittle material. If you try and bend that
14 it will crack in areas and release any stress concen-
15 tration. The pipe, on the other hand, which is
16 embedded within the frost bulb, is a ductile material
17 which can bend, and it's also a very great deal more
18 stiffer than the -- stronger than the soil.

19 Q Well in the pencil
20 example, it is only the pencil wood that is notched,
21 not the lead interior. Let's assume that.

22 A Fine, sir.

23 Q And I take it that when
24 the pencil wood is notched, an area of weakness is
25 created.

26 A That is correct.

27 Q And the stresses con-
28 centrate on that area of weakness, and lead to the
29 breaking of the pencil.

30 MR. GENEST: But that assumes,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 Mr. Commissioner, that the lead is weaker than the
3 wood.

4 MR. SCOTT: Well?

5 MR. GENEST: And here we've
6 got a piece of steel inside the wood.

7 THE COMMISSIONER: Well, let
8 Mr. Scott develop this analogy.

9 MR. GENEST: All right.

10 MR. SCOTT: All right.

11 Q Well, what I'm asking
12 you is simply this, if the ice bulb over a length has
13 an area where the soil and frozen water are less
14 strong than in another area of the ice bulb, does that
15 have any effect in terms of concentrating the stresses
16 on the pipe, any effect whatever?

17 A I couldn't really say
18 no effect whatever, sir. I would expect the effect
19 would be minor.

20 Q Well, has anything been
21 done by way of studies to determine, not whether the
22 pipe sitting alone is concerned, but whether the pipe
23 in the frost bulb may have areas of stress concentrated
24 where the bulb is weakest? Have you done any work on
25 that?

26 A No, we have not, sir.
27 There is one thing I'd like to just point out, however,
28 with this analogy with the pencil, and that is the
29 lead within the pencil is very brittle. I don't think
30 we're able to compare that to a pipeline in a frost

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 bulb.

3 Q I got that from your
4 pencil expert in the first row.

5 A Perhaps a better analogy
6 would be a steel -- oh, a long slender steel member
7 with putty on the outside of it.

8 Q Well, let me ask you
9 this, if you put a piece of steel inside the pencil,
10 instead of a piece of lead, and tried to bend it,
11 and there was a deficiency in the wood, do you think
12 that would have any effect whatever on concentrating
13 the stresses where the wood is weaker?

14 A It certainly would, sir.
15 Eventually the wood would crack and splinter apart,
16 but the steel within the wood there of course would
17 take quite considerable bending in addition.

18 Q Would you agree with me
19 that it would, however, even if the steel in the pencil
20 didn't break, it would concentrate the stresses at that
21 point on the steel?

22 A It could, sir, that is
23 correct,

24 Q Well now, can I -- Mr.
25 Purcell, ask you --

26 THE COMMISSIONER: Excuse me,
27 just so I understand where we're at, that's the point
28 that you were seeking to make. Well, I have got it.

29 MR. GENEST: Thank you, sir.

30 MR. SCOTT: Well now, let me

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 ask a question or two to be sure I understand about
3 fracture propagation.

4 Q Mr. Purcell, do I under-
5 stand that the crack when -- do I understand that when
6 the pipeline is under pressure, a fracture will travel,
7 if it's going to propagate, at about 1,100 feet per
8 second?

9 WITNESS PURCELL: It's the
10 upper limit, I think Mr. Holmberg said that was the
11 highest velocity that had ever been measured.

12 Q Is there any average
13 or any optimum velocity that is likely?

14 A You spoke of 700 to --

15 WITNESS HOLMBERG: 400 to
16 700 feet per second is more general, for the sheer
17 type fracture.

18 Q Do I understand that one
19 of the things, perhaps not the only thing, but one of
20 the things that makes the fracture propagate is the
21 pressure of gas on the crack?

22 WITNESS PURCELL:
23 A Yes sir.

24 Q And the effect is that
25 the pressure of gas in effect trying to get out of the
26 pipe, pulls the crack on a little further.

27 A Yes, it acts to open
28 up the pipe behind the crack, and that mechanism trans-
29 fers the energy of the gas to the crack tip and
30 drives it forward.

Q Yes, and I take it that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 the function of the fracture band is really to confine
3 the emission of gas, to prevent the emission of gas at
4 a certain point so the crack will not feed and there-
5 fore move.

6 A No sir, it's the function
7 of the band to stop the crack.

8 Q Well, how does it stop
9 the crack?

10 A It does it in two ways
11 theoretically. The only way we've been able to test
12 is the first way. In that manner it does it by reduc-
13 ing the stress at the crack tip. The gas pressure is
14 applied to twice the thickness of the material. The
15 stress is lower, and in our tests so far that has
16 stopped the crack.

17 Q Yes.

18 A The second mechanism has
19 to do with restraining the opening of the pipe, but
20 that assumes that the crack has driven through the
21 crack arrestor.

22 Q yes.

23 A . And we've not been able
24 to test that because we've stopped the crack at the
25 first chance every time.

26 Q So the situation is that
27 the band is designed to double or add to the dimension
28 of the steel pipe so the crack will have to work
29 harder to get through.

30 A So there will be less

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 stress at that point and the crack will stop, yes sir.

3 Q Well now, I understood
4 from Mr. Holmberg that you did five tests which I
5 think Mr. Gibbs analyzed with you in some detail.

6 A Mr. Gibbs tried to do
7 five tests. We kept talking about three.

8 Q I see, and do I under-
9 stand that each of those tests were in sections of
10 800 feet?

11 A Well, I think there was
12 some misunderstanding between -- after Mr. Holmberg
13 looked up his records he had some different informa-
14 tion.

15 Q Well, were any of them
16 in sections longer than 800 feet?

17 WITNESS HOLMBERG:

A No sir.

18 Q Well, let me ask you,
19 would a test on a longer section, let us say 3,000
20 feet, where there is a different volume of gas, raise
21 the possibility that the results might be different?

22 WITNESS PURCELL:

A No, it wouldn't, Mr.
23 Scott. These tests were designed so that the section
24 was long enough so that there was no end effect. The
25 reflected wave from the end of the pipe does
26 not come back and meet the crack before the crack is
27 stopped. So the crack sees an infinitely long pipe,
28 there is no scale effect from these tests.

29 Q Let me ask you this.
30 Is it your view that -- or do you agree that a longer

Purcell, King, Koskimäki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 pipeline, let us say 2,000 feet, would have more gas
3 to sustain the pressure on the fracture crack?

4 A Not in the tests we
5 conducted because the crack stopped before there was
6 any effect from running out of gas.
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1 Q So I take it that you -- do
2 you see any possibility that a test on a longer section,
3 where there is more gas under the same pressure, might
4 have different results?

5 A For the tests we conducted,
6 any amount of pipe could have been added to the end of
7 the test section, and it would not have affected the
8 results.

9 Q In short then, do I under-
10 stand that you're satisfied that there is no need to
11 test the fracture band on a longer section of pipe?

12 A I am, yes sir.

13 Q Yes. Now I think, Mr.
14 Holmberg, in answer to Mr. Gibbs, said that in one of
15 the tests, he called it the fifth, the pipe was
16 buried. Is that correct?

17 A Yes.

18 Q What was the result in that
19 test?

20 WITNESS HOLMBERG:

21 A In all five tests that
22 were referred to, the pipe was buried. The last test,
23 the fifth test that we are talking about, it had
24 crack arrestors. However, the fracture did not
25 propagate up to the crack arrestors, so we did not get
26 a test on the crack arrestor. The fracture terminated
27 before it got to the crack arrestor. Then there was
28 some whipping action of the pipe and a new fract-
29 ure was initiated behind the crack arrestor.

30 Q Yes. Was there any tests of



1 the
2 / three or five, depending on how you view it, in
3 which the ground was frozen as in a frost bulb
4 situation?

5 A The first and second tests,
6 first, second and third tests were made in which the
7 ground was frozen.

8 Q Yes. Do you know to what
9 distance from the pipe?

10 A It was in the order, I believe
11 of something like 10 or 12 inches, a small bulb.

12 Q Yes. And what was the
13 result with respect to the effectiveness of the fract-
14 ure band in those three tests where the ground around
15 the pipe was frozen to a distance of 12 inches?

16 A The first tests in which
17 the ground was frozen, was a test in which a fracture
18 or crack arrestor was not included in the test. It
19 was the test in which a fracture, one of the fractures
20 terminated at a flange.

21 Q Yes.

22 A We did not consider that a
23 crack arrestor test.

24 Q Yes.

25 A the next test was one in
26 which we incorporated a crack arrestor. The ground
27 was frozen and the fracture terminated at the crack
28 arrestor. Then we made two additional tests to delib-
29 erately check crack arrestors, and these tests --

30 Q In the case of frozen
ground?

1 A These two tests coming up
2 now to just check crack arrestors, they were not made
3 in frozen ground.

4 Q Yes. Well was there a
5 third test made in frozen ground?

6 A A third test was made in
7 frozen ground, and that is the one that I described a
8 few minutes ago, in which the fracture did not propa-
9 gate up to the crack arrestor, so we failed to get a
10 test on the crack arrestor in the frozen ground on our
11 third test.

12 Q Is there any possibility --

13 A It didn't show that the
14 crack arrestor didn't work. We just didn't succeed
15 in testing what we wanted.

16 Q Is there any possibility
17 that the existence of a frozen frost bulb of some
18 di_mension, let us say ten feet, may contain the
19 pressure of the gas to a certain extent, if only for
20 fractions of seconds?

21 A I believe the addition of
22 a thick ice bulb, such as you're describing, would
23 definitely be beneficial. And it will be beneficial
24 in this way: The driving force for a shear crack is
25 related very much, or principally to the opening up
26 of the pipe. It develops these flaps that open up,
27 and the added weight and added mass, plus the reinforc-
28 ing effect of a large ice deposit around the pipe
29 would be expected to retard that opening up, and in
30 this respect, reduce the driving force on the tip of

1 the crack?

2 Q Is it possible that the
3 presence of that frost bulb of that dimension might as
4 well confine the emission and retain the pressure of
5 the gas for fractions of seconds longer?

6 A Yes.

7 Q Is there any way of judging
8 on the basis of the tests you have now, the consequence
9 of that?

10 A I think there's a possibility
11 of this. After hearing some of the testimony last
12 week along this line, I had some discussions with the
13 geotechnical people, and they think -- they would
14 like to review the data that we have, with the idea
15 of trying to work out a model and make some calculations
16 to see whether there would be any beneficial effect .
17 This has not been done, however.

18 Q I understood you to say in
19 answer to Mr. Gibbs that in fact you were going to do
20 some more tests on the fracture band ?

21 A Yes, we are going to do
22 some more tests on the fracture band.

23 Q Is one of them going to be
24 a test, as far as you can judge now, in which there
25 will be a substantial frost bulb?

26 A The frost bulb will probably
27 be only in the matter of a foot or something, in that
28 order. The reason for that is, our primary interest
29 and concern is being able to check the effect of low
30 temperatures on the metal, and we haven't considered

1 the reinforcing effect of the -- you might say the
2 ice. This is something that may be reconsidered, but
3 the plans at present are not to make a test where you
4 would have a large massive ice bulb.

5 Q Yes. Now when do you anti-
6 cipate that these reports will be available?
7 Or are you able to say?

8
9 A There has been some pre-
10 liminary, very preliminary reports prepared in which
11 they have simply reported the results of the data, and
12 one of the meetings that I attended, there was dis-
13 cussion about whether we should prepare a report now
14 or wait and get the results of all our tests and then
15 write a single report, in which we could incorporate
16 the results of the different tests and the different
17 variables that were affected.

18 I frankly can't tell you when
19 that -- what the schedule is for that report at
20 present.

21 Q Well now I would like to
22 ask a question or two about corrosion. Mr. Rathje,
23 do I understand that it's very important to eliminate
24 even the smallest pinpoint holes in the coating?

25 WITNESS RATHJE:

26 A No, the smallest pinpoint
27 holes would not create any kind of a problem. Where
28 we would run into problems would be where the hole
29 would be much larger than a pinhole.

30 Q Well, do I understand that

1 if there is first of all, a small hole in the pipe,
2 let us assume corrosion creates a small hole in the
3 pipe, that that pipe hole may lead, in some cases, to
4 a fracture?

5 A Well I suppose it could,
6 but I would think that any small hole in the pipe, if
7 it was going to develop in that fashion as a small
8 hole, probably would not lead to a crack. A leak
9 would be detected much earlier than developing a
10 crack.

11 MR. GENEST: Mr. Commissioner,
12 excuse me. I wonder if Mr. McMullen could be excused
13 for a moment. Would that be satisfactory?

14 MR. SCOTT: Yes.

15 MR. GENEST: Thank you.

16 MR. SCOTT:

17 Q Well now, I take it that
18 the two techniques for dealing with corrosion are the
19 cathodic protection and an outer coating of some
20 type?

21 A That's correct.

22 Q Yes. And I take it that
23 those are traditional techniques in protecting
24 a pipe from corrosion?

25 A Yes, sir.

26 Q And that with respect to
27 the cathodic protection, that that protective device
28 is limited in its usefulness to certain kinds of soil
29 conditions?

30 A Yes, sir. Where you would

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 run into the case of your ground bed being in frozen
2 ground, and your pipe being in thawed ground, you
3 would find it extremely difficult, if not possible,
4 to get enough protective current going towards your
5 pipe through frozen ground.

6 Q Yes. So would it be fair
7 to say that the cathodic technique is not likely to be
8 as useful in frozen ground, as it is in unfrozen
9 ground?

10 A No sir, we don't expect to
11 have any situation where the ground bed would be in
12 a frozen area, and then the pipe could be in a thawed
13 area.

14 Q Are there any soil conditions
15 on the proposed route in which you think the cathodic
16 protection device will be less than usually defective?

17 A Only in those areas that
18 I have pointed out where you would have the pipe in a
19 thawed area. Now, this could occur possibly in a
20 river crossing or something of this nature. Now, in
21 that case we would go to a different kind of cathodic
22 protection, which would be a galvanic anode type of
23 cathodic protection, that would be effective in such
24 a situation.

25

26

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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 Q Well, what about the
3 situation immediately following construction in ^{the year or} two years
4 before chilling of the pipe, when the pipe is sitting
5 perhaps on a frozen bed but placed in disturbed soil?
6 Is the cathodic device likely to work as effectively
7 as normal there?

8 A Perhaps not
9 as effective as it would eventually be, but it would
10 still be effective.

11 Q Would you be content to
12 utilize only the cathodic protection device with respect
13 to this pipeline?

14 A Yes sir, in combination
15 with the coating.

16 Q No, without the coating.

17 A No sir.

18 Q Why not?

19 A Well, because of the
20 frozen soil it would become almost an impossible task
21 to provide enough current to protect a bare pipeline.

22 Q Well now, the protective
23 coating, I understand from Mr. Bayly's question, is
24 going to be applied either on the site or in the
25 factory.

26 A Yes sir.

27 Q Have you any way of
28 telling us which is the application point of choice
29 as far as corrosion is concerned?

30 A We have not made that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 choice yet, sir. There are other factors that perhaps
3 in construction difficulties or logistics problems
4 where we could use either one or the other, depending
5 upon the circumstance.

6 Q Isn't it likely, Mr.
7 Rathje, that if the coating is put on in the factory,
8 it may be damaged before placement?

9 A Well, there is that
10 possibility, sir. However, this particular coating
11 which is put on in the factory is extremely tough,
12 and can tolerate a very large degree of handling and
13 damage that might be caused by handling, and at the
14 same time there would still be patching in the field
15 to cover any areas that were damaged.

16 Q Well, let me ask you
17 this. If a bit of the coating were chipped away, what
18 size coating can you lose without running any risk of
19 corrosion? Any?

20 A Well, this is a theoretic-
21 al type of question and very difficult to pin down
22 the exact size that you could not protect. It depends
23 on a great number of circumstances.

24 Q Well, I ask you the
25 question because you told me that pin-point holes in
26 the coating would make no difference.

27 A That's correct.

28 Q How large does the hole
29 have to get before it comes to make a difference?

30 A Oh, perhaps in the worst

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 case, in the order of several inches in diameter.

3 Q Yes, and is it your
4 position therefore that the coating can be removed for
5 an area of several inches in diameter without any
6 risk of corrosion?

7 A Well, if they were
8 handling damages that were noticed and the pipe will
9 be checked for this prior to installation, they would
10 be fixed up.

11 Q I understand that you're
12 not going to let this happen, and I accept that; but
13 I'm asking you if by any chance it does happen, are
14 you telling us that a hole of that dimension will not
15 risk corrosion?

16 A The cathodic
17 protection should be able to handle that.

18 Q I take it if you had
19 no cathodic protection in that particular area, a
20 hole of that dimension would raise serious risks, is
21 that not fair?

22 A I would not use the
23 word "serious". There would be a degree of corrosion
24 that would occur, yes sir. We're talking about frozen
25 ground here and low temperatures and corrosion is
26 much, much reduced under these conditions.

27 Q Are you aware of any
28 reasons why the danger to the coating in northern areas
29 may be greater than the danger to the coating in south-
30 ern areas?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 A Perhaps due to the handling
3 of the coating in cold temperatures and frozen
4 backfill, this type of thing, yes, you could say that
5 there's more expected damage that could occur in a
6 northern environment.

7 Q And is that because of
8 the necessity of inserting backfill into the pipe
9 trench that may indeed be frozen, and therefore likely
10 or possibly likely to damage the coating?

11 A Well, this will be one
12 of the construction considerations that would be taken
13 into account.

14 Q Well now, we've been
15 told by the geotechnical panel that the pipe will move
16 in certain cases in the ground. Is there any risk to the
17 coating in that process at all? Rubbing against rocks
18 or what have you.

19 A In the general case, no;
20 but if the pipe were to be, for an example, I suppose
21 pressed against a sharp rock, well then you
22 could expect some damage.

23 Q I'm sorry?

24 A You could expect some
25 damage if the coating were to be pushed against a
26 sharp rock.

27 Q Well now, Mr. Purcell,
28 Mr. Bayly has dealt with the subject of the economic
29 consequences of chilling, if any, and I think he put
30 it to you that Dr. Clark said that as far as he knew

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 there were no economic advantages to chilling, but in
3 fairness to him, he referred the question to this
4 panel, as I understand his answers. Do I understand
5 your answers to Mr. Bayly to be that overall, that
6 is, adding the pluses and subtracting the minuses,
7 you're not aware of any economic advantage to chilling?

8 WITNESS PURCELL: From the
9 standpoint of the compressor station costs, there is
10 a small advantage that I discussed with Mr. Bayly, but
11 there are so many unknowns in making the comparison
12 when you get to the pipeline that my conclusion is that
13 there is no economic incentive to either carry chilling
14 a long distance or stop it abruptly. In my opinion, it's
15 a geotechnical decision as to where the chilling should
16 be stopped.

17 Q Excuse me one moment.
18 Again in answer to my friend, you advised him that you
19 had selected compressor locations bearing in mind the
20 optimum performance of the line, if I could put it
21 that way.

22 A Yes sir.

23 Q Yes, and I think you
24 then went on to say that you made some marginal changes
25 in your mathematics to get the compressor pads off
26 river basins and wherever they may have by mathematics
27 landed.

28 A No, the changes were
29 made by Dr. Clark and his people for reasons of
30 fitting the terrain better.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 Q I see.

3 A And then we checked those
4 movements with the system model to determine that there
5 was no large effect from making the movements.

6 Q Yes. Well now Mr. Dau
7 and I think Dr. Clark told us that the compressor
8 stations can be moved within a certain degree, depending
9 on whether you're moving upstream or downstream.

10 A Yes sir, I understand
11 that.

12 Q And that the ability, if
13 I can put it this way, to move compressor station A
14 at all depends on the extent to which you have moved
15 compressor station B and C, the ones adjacent to it.

16 A Yes, there is an inter-
17 relationship among the stations.

18 Q Well now, I think we
19 asked Mr. Dau for this and perhaps -- and we certainly
20 haven't got it yet. Perhaps you can -- you have the
21 expertise to obtain it. Is it possible for us to
22 know the amount of flexibility that presently remains
23 with respect to each -- with respect to the location
24 of each of the proposed compressor stations?

25 A It could be calculated,
26 Mr. Scott. It's a matter of taking each station in the
27 model of the system and moving it different distances,
28 and determining the effect on the throughput of the
29 system.

30 Q Yes.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 A It's not impossible, but
3 it's a fairly large job.

4 MR. SCOTT:

5 I don't want to impose
6 any further large jobs on my friend, but I wonder if
7 he could perhaps consider that as information that the
8 Commission might want to have?

9 MR. GENEST: Well, it seems
10 to me it's a question of the use of it. Without more,
11 as I understand the situation, without more site
12 specific information it's difficult to tell you what
13 compressor station at site MP-106, how that can be
14 moved because that depends on the site specific in-
15 formation.

16 MR. SCOTT: I didn't understand
17 that it depended on site specific information, does it?

18 A Yes sir, it does. We
19 have a profile of the route and the system model.
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21
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Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 And we would -- in moving the
2 station an interval, would take into account the
3 elevation change.

4 Q I see.

5 A And the resulting change
6 in ground temperatures, if any, air temperatures and
7 so forth.

8 Q Well --

9 A It becomes a little bit
10 academic to do that kind of study, because what you
11 wind up with is a long list of the possible movements
12 of each station, but you get no feeling for the com-
13 binations, for the total flexibility of the system,
14 because moving one station by itself gives you a set
15 of answers, and you can move two stations and get a
16 different set of answers, and there's an infinite
17 combination.

18 Q Well perhaps, Mr. Commiss-
19 ioner, the best resolution of this is to invite Mr.
20 Genest on a case by case basis as they develop, to
21 determine whether compressor station M105 can be
22 moved in what direction.

23 MR. GENEST: That to me would be
24 a more practical use. If there is a problem identi-
25 fied with the particular station, then I think we can
26 provide the information as to what flexibility we have
27 and what effect that has on the remaining stations.

28 A We did provide examples of
29 this information in response to the assessment group
30 questions.

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 MR. SCOTT: Yes. My concern,
2 Mr. Commissioner, is simply that if and when these
3 concerns are raised with respect to the location of
4 specific compressor stations, we can get from my
5 friend information as to the extent to which they may
6 be moved without altering the optimum operation of the
7 system.

8 MR. GENEST: I think we can
9 provide that.

10 Perhaps I should add for Mr.
11 Scott's benefit, that again we might have to defer
12 that, because if we give you an answer on the movement
13 of one, and then later on we have to move -- or there
14 is a suggestion that there's a possibility of a move
15 of another one, it affects the first answer, so that
16 perhaps when we can collect this at a certain stage
17 in the proceedings, and present a total picture.

18 Because an answer on one might
19 be misleading, if later on there's a concern about
20 the next station and we have to move that one. Perhaps
21 my friend and I can work that out.

22 MR. SCOTT: Mr. Commissioner.
23 I'll be a half an hour more, Mr. Anthony and one or
24 two others -- I shouldn't pin it on him, I suppose,
25 but it was suggested that in order to permit those
26 who don't have to hang around for my extra half hour,
27 that you might want to deal with the motion first
28 this afternoon, it being thought that that would take
29 an hour, or an hour and a half.

30 I gather from Mr. Genest that the

1 panel wasn't intending to leave this afternoon in any
2 event. That doesn't mean they wouldn't make a mad
3 rush for the airport if they had the chance.

4 I don't -- as I have to be here
5 for both, I'm not personally concerned, but I --

6 THE COMMISSIONER: I think the
7 panel's convenience comes first, if there is any way
8 of putting it first.

9 MR. GENEST: My feeling, at least
10 my feeling is that I think they would like to be
11 finished.

12 MR. SCOTT: Well then that's
13 fine. I understand it isn't pressed.

14 THE COMMISSIONER: So where does
15 that leave us? Adjourning now for lunch and coming
16 back when? I know the official court reporters prefer
17 to have a break until 2:30, but is that all right?

18 MR. SCOTT : That's fine, as far
19 as I'm concerned.

20 THE COMMISSIONER: All right, Mr.
21 Genest?

22 All right, we will adjourn it
23 until 2:30 then.

24
25 (PROCEEDINGS ADJOURNED TO 2:30 P.M.)
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29
30

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: I should like to announce that Diana Crosby, of the Commission staff, has obtained a copy of the film about the Canol Pipeline, and she is showing it here at six o'clock this evening, so one and all are cordially invited.

MR. SCOTT: You better get Mr. Genest there, he pretends he never heard about it.

MR. GENEST : Is it going to be part of the evidence, sir?

THE COMMISSIONER: Not unless people like you keep raising questions like that.

MR. SCOTT: Q Mr. Rathje, I am not quite sure that I understood what you and I were talking about when we were talking about corrosion this morning. First of all, can you help me by telling me what will happen if corrosion occurs at a spot in the pipeline, what's the consequence of that?

WITNESS RATHJE: In time you would get a leak at that point.

Q Yes, and what happens when you have a leak? Perhaps someone else on the panel -- your corrosion techniques, sir, are supposed to work so well perhaps you don't know what happens when they don't work. Perhaps someone else could tell us what will happen if there is corrosion of the type we're talking about.

WITNESS RATHJE: I think perhaps Mr. Holmberg might have some idea.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 WITNESS HOLMBERG: You're
3 talking about a small isolated area that might be
4 bare and get -- have corrosion at a localized spot,
5 is it?

6 Q Yes, let's say a spot
7 about the size of a quarter that corrodes through.

8 A If you have a localized
9 spot like that that corrodes through, you will simply
10 have a leak. You won't have danger of a rupture, it
11 would be a round leak and the stresses around a small
12 opening like that are very, very low, and that type
13 of failure is not likely to result in a rupture. It's
14 a long longitudinal type of defect. Now another thing,
15 there's been a lot of testing done on old corroded
16 pipe and where you have an isolated pit you can get
17 down to just a few thousandths of an inch in thickness
18 and it still won't leak, it will still withhold pressure.

19 Q Well, am I to understand
20 from that that a hole caused by corrosion, let's say
21 the size of a dime, only has economic consequences
22 in that you lose gas.

23 A You lose gas, and of
24 course it should be repaired.

25 Q Yes. Now what follows
26 if it's not repaired, apart from continued leakage?

27 A Well, it would continue
28 to leak, but really nothing else would happen although,
29 and I'm trying to think in these circumstances what
30 you can do with a leakage action can cause turbulence,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 and over a long period of time I presume would possibly
3 cause some erosion or something of that type.

4 Q Is there any prospect at
5 all that the pressures of gas may widen the opening,
6 the leak?

7 A No, not unless you get
8 this erosion or turbulence.

9 Q And how is that caused?

10 A Well, it may be caused
11 by the escaping gas, I won't say causing turmoil as
12 far as the surrounding soil, stirring up the surrounding
13 soil.

14 Q Well now, Mr. Rathje,
15 dealing with the cathodic protection technique alone,
16 for the moment, did I understand you to say that that
17 would be effective with respect to the protection of
18 this pipeline?

19 WITNESS RATHJE: Yes sir.

20 Q And that is so both in
21 permafrost and non-permafrost areas?

22 A Yes sir.

23 Q You have no reservations
24 about that?

25 A None.

26 Q Well now, Mr. Purcell,
27 what is the life of a compressor? Does it have some
28 economic life at which time it must be replaced, or
29 is likely to be required to be replaced?

30 A It depends on

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 what type of turbine you put in. If it's one of these
3 large industrial turbines, many of them have been
4 running for more than 100,000 hours. They need
5 periodic overhalls but the turbine itself will last
6 quite a while.

7 Q Well, what about the
8 turbines that you're putting in on this line?

9 A Well, there will probably
10 be a mixture of industrial type and what we call the
11 aircraft derivative type. The aircraft type are the
12 ones that have been -- the jet engines that have been
13 adapted for industrial use, and those normally last up
14 to say 30,000 hours, and then you take them out and
15 replace them, overhaul the jet engine off-site.

16 Q What is 30,000 hours in
17 terms of this operating pipeline?

18 A 30,000 hours is about
19 3 1/2 years.

20 Q And what's 100,000 hours?

21 A 12 years, I guess.
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Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 Q Well now, Mr. Purcell, perhaps
2 this question is obvious, but when was the decision
3 made to utilize gas at the compressor stations?

4 WITNESS PURCELL:

5 A It's the normal method of
6 operating a gas pipeline. I think it was taken for
7 granted from the beginning.

8 Q Yes. And I take it that
9 the cost is between six and seven percent of the
10 volumes?

11 A The gas usage is of that
12 order, yes.

13 Q Yes. I take it that in
14 this particular case, and again perhaps it's obvious,
15 no consideration was given to other power sources
16 than natural gas?

17 A Not^{to}/the point of consider-
18 ing them seriously as alternatives. We did examine
19 at one point the feasibility of using power from a
20 proposed dam on the Great Bear River --

21 Q Yes.

22 A -- and we have had discuss-
23 ions concerning the liquids that would be produced at
24 the Richards Island processing plants.

25 Q Have you got reports on
26 either of those alternative sources which your coun-
27 sel can make available? They may be listed, I
28 don't know, but - -

29 A We have a report on the use
30 of electricity from the Great Bear Dam. I think it's

1 listed as a relevant document.

2 Q Yes.

3 A We did not do a study and
4 do not have a report on the use of hydrocarbon liquids
5 as fuel .

6 Q And I take ^{it}/alternative
7 power sources could be proposed at any stage before
8 final design?

9 A I think that's -- yes,
10 they could.

11 Q And indeed during the life
12 of the pipeline?

13 A It's possible, yes sir.

14 Q wouldn't that -- and I
15 take it that an appropriate stage, perhaps, to con-
16 sider alternative sources, would be as your turbines
17 required renewal?

18 MR. GENEST: As our what, Mr.
19 Scott?

20 MR. SCOTT: Turbines.

21 A I would think it would be
22 more likely before you installed the turbines
23 initially, because you've got quite an investment
24 in fuel gas piping for example, that would not be
25 useable if you had an alternative power source.

26 Q It's perhaps obvious, but
27 I take it that the cost of alternative power sources
28 as opposed to gas, is a dominant consideration?

29 A Yes, it is.

30 Q And I take it further, apart

1 from cost, the price at which you sell or your --
2 the persons to whom you provide, sell their own gas,
3 is an important consideration?

4 A The cost of an alternative
5 fuel in relationship to the cost of using the gas, is
6 that the question?

7 Q The cost of an alternative
8 fuel in relation to the cost at which your customer,
9 who owns the gas will sell it in the south?

10 A It would be a consideration,
11 I suppose, Mr. Scott.

12 Q What I'm putting to you,
13 isn't there at least a theoretical possibility that
14 the value of gas in southern Canada and the United
15 States will become so great, that you may want to
16 consider an alternative energy source, if one be
17 available, for these compressor stations?

18 A That's possible, yes, sir.

19 Q Now Mr. Reid, I would like
20 to ask one or two questions about pipe testing.
21 At Volume 31, page 3962, in response to a question
22 that Mr. Anthony raised with you, I think you said
23 that the water discharged after hydrostatic testing
24 would be at 32 degrees Fahrenheit?

25 WITNESS REID:

26 A Yes sir, this refers to the
27 warm water test method, yes.

28 Q Yes. And that, just so
29 we will have it, at Volume 29, page 3676, you said,
30 and let me read it to you:

1 "For an additional period
2 of time, sometimes referred to as the cir-
3 culation time, warm water is continued to
4 be pumped through the test section, thus
5 warming the backfill until the temperat-
6 ure of the water being discharged reaches
7 the specified temperature somewhat above
8 32 degrees Fahrenheit. This can be as high
9 as 40 or 50 degrees Fahrenheit",

10 and I take it that you were there talking about the
11 discharge before the hydrostatic test actually begins?

12 A Did you say 40 or 50 degrees
13 Fahrenheit, sir?

14 Q You said, if I report it
15 correctly --

16 MR. GENEST: What is the page,
17 Mr. Scott?

18 MR. SCOTT: 3676.

19 Q "This can be as high
20 as 40 or 50 degrees Fahrenheit"?

21 A I would like to check that,
22 sir.

23 Q Yes.

24 THE COMMISSIONER: Well if you
25 didn't say that --

26 A I'm sorry. Yes, I believe
27 I said 40 or 45 degrees Fahrenheit, and then that is
28 true.

29 MR. SCOTT:

30 Q Just so we'll understand

1 clearly, there is no inconsistency here, is there?

2 We're talking about two volumes of water.

3 A Yes, sir.

4 Q The first is the volume of
5 water that is put in at quite high temperatures to
6 warm the pipe?

7 A Yes, sir.

8 Q Yes. And what happens is
9 there's a run-off at the end of the pipe, at which you
10 test the temperature of the water, to get it to 32?

11 A Yes, we test the temperature
12 of the water coming out of the pipe and it increases
13 above 32 degrees Fahrenheit --

14 Q Yes.

15 A -- quite often as high as
16 40 or 45.

17

18

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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
~~Cross~~ Exam by Scott

1
2 Q And the water pouring
3 out at that end is quite often as high as 40 or 45
4 degrees.

5 A correct.

6 Q Yes, and I take it that
7 in utilizing that water to prepare for the hydrostatic
8 testing you will probably use in excess of 2 million
9 gallons of test section.

10 A Yes, that would be correct.

11 Q And it is after that exer-
12 cise that the hydrostatic test begins.

13 A correct.

14 Q And then at the end of
15 that you will release about 2 million gallons again
16 of the test water at 32 degrees Fahrenheit.

17 A Right, the total volume
18 of fluid will have been removed and released.

19 THE COMMISSIONER: And you
20 don't use the test fluid again.

21 A No sir, it's generally
22 discharged.

23 MR. SCOTT:

24 Q Now, this may be all
25 academic because I understood you to say -- perhaps
26 you can tell me if this is your evidence -- that warm
27 water testing will not be used north of 60.

28 A I stated, I believe,
29 that water methanol testing will be the predominant
30 method, and I knew of no specific test section which
was planned as a warm water test section.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
CrossExam by Scott

1
2 Q Well, let me pursue that
3 a little bit. In the application volume, 13-a-7, page
4 6061, I don't have it in front of me but I have the
5 quotation. Perhaps you want to get yours in front of
6 you. 60-61.

7 A I believe I have that
8 in front of me, sir.

9 Q On that page you say:
10 "The pipeline in permafrost regions will be
11 tested."

12 Do you have that?

13 MR. GENEST: Second last
14 paragraph.

15 MR. SCOTT: It's the second
16 last paragraph.

17 A Correct, yes, I have it.

18 Q
19 "The pipeline in permafrost regions will be
20 tested during the winter construction season
21 and the test medium will be either water or
22 water freeze depressant solution. The choice
23 of the test method and media used on perma-
24 frost regions will be based on a number of
25 considerations,"
26 and then I take it that five of them are listed.

27 A Correct.

28 Q Now do I understand you
29 to say that in virtually all cases, you will use the
30 methanol technique?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 A Yes sir, it is definitely
3 the predominant method.

4 Q And I take it then
5 notwithstanding that provision in the application we
6 may conclude that the predominant method will be the
7 methanol method.

8 A Yes sir.

9 Q Are you able to envisage
10 any case on this route when it will not?

11 A After I made the statement
12 to Mr. Anthony that I could not think of a specific
13 site, I thought about it slightly, and I think now
14 that perhaps something like a river crossing would
15 be a suitable application for a warm water test.
16 In that situation we generally do not have permafrost
17 and being a river crossing, there is an abundance of
18 water.

19 Q Yes, and I take it that
20 -- have you considered that as a possibility?

21 A Definitely a possibility,
22 yes.

23 Q Because have you con-
24 sidered the risk involved in injecting large quantities
25 like millions of gallons of warm water into a stream
26 or river?

27 A Yes sir, that's
28 definitely a consideration.

29 Q I put it to you that
30 that's a serious consideration against using warm water

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 testing at those locations.

3 A For a crossing of the
4 Mackenzie I would not consider it a serious situation
5 because the warm water could be spilled onto ice and
6 then would return to 32 degrees Fahrenheit very rapidly.
7 It would not actually be poured into open water.

8 Q Well you see, before we
9 get to the biology people, who will be coming along
10 later, we have to know with as much precision as we
11 can what you intend to do.

12 Now do I understand you to say
13 you will not be using warm water testing at river
14 crossings except the Mackenzie?

15 A No sir.

16 Q You may use warm water
17 testing at other river crossings?

18 A Yes sir.

19 Q Is there any way you can
20 assist us in determining when you will and when you
21 won't?

22 A I have not really con-
23 sidered this because the detailed testing plan depends
24 upon the final design of the pipe. In a general way
25 I would say a major river crossing, which is construc-
26 ted separately from mainline pipe as opposed to a
27 minor river crossing which would be part of what I
28 would term mainline construction, it would go through
29 the river in a process of doing mile by mile construc-
30 tion. A major river crossing would be constructed

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 separately, and then the mainline construction would
3 come up to it on one side and leave on the other. On
4 a major river crossing, each individual crossing would
5 be investigated to see if warm water testing were a
6 possibility.

7 Q Well, what is going to
8 be the standard of whether it is or whether it isn't
9 utilized?

10 A I would say the first
11 three criteria that are listed -- the environmental
12 sensitivity of the test section area, the availability
13 of water, and (3) being the effect on surrounding
14 permafrost, that would -- if there were no permafrost
15 under the river that would make it a suitable crossing
16 to be investigated for warm water testing.

17 Q And I take it to be a
18 suitable crossing for warm water testing it has to have
19 a substantial flow of water.

20 A Yes sir.

21 Q Well now, what I am
22 really concerned about is factor 1, the environmental
23 factor. Are you going to -- are you in fact going to
24 submit to your biological advisors on this matter, or
25 are you not?

26 A We definitely are, sir.
27 The environmental sensitivity of a test section area
28 would specifically in this context refer to a river
29 where there were, say, over-wintering fish populations
30 downstream of the pipeline crossing. In such a case,

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 the possibility of a methanol spill might be ruled
3 unacceptable or intolerable and therefore perhaps a
4 warm water test would be dictated.

5 Q Well, I don't want to
6 press you too far, but do I understand it to be this,
7 as between these two test methods, when you come to
8 a situation where warm water testing is in your
9 terms possible, that is the volume of flow and so forth,
10 are you going to allow your fish man to have a veto?

11 A Certainly.

12 Q When Mr. Anthony cross-
13 examined you in Volume 31 -- and I'll just give my
14 friend the page reference, 3978 to 3980 -- you indicated
15 that if during the course of a methanol test the fluid
16 spilled, that it would be recovered by suction pumps.
17 Is that the technique that is proposed?

18 A Yes sir.

19 Q I think you also went
20 on to say that the fluid would not be absorbed into
21 the ground before it could be sucked up.

22 A Generally the pipe
23 ditch will be frozen, and there will be, the test fluid
24 will permeate the backfill but generally it will come
25 to the surface.

26 Q I think that's what you
27 said to Mr. Anthony because the ground was frozen you
28 would have time to operate the suction pump. Well
29 now, isn't methanol in fact a kind of anti-freeze?

30 A Yes sir.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 Q And isn't there a risk
3 that it is going to melt through the frozen surface
4 into the mosses and lichens and whatever is below,
5 before you can get your suction pumps and bladders
6 into operation?

7 A I would say it would
8 definitely come in contact with the surface vegetation,
9 yes.

10 Q And I take it that even
11 below the frozen ground it's obvious that the organic
12 material there remains porous, and if it gets to that
13 point it will absorb the methanol, or the solution.

14 A Some of the solution
15 may permeate the porous material, yes.

16 Q And I take it that to
17 the extent that happens, the fluid cannot be removed
18 by suction or any other known technique.

19 A Correct.

20 Q Well now, let me ask you
21 a question or two, if I can understand it, about the
22 distillation technique. I take it the technique is this,
23 that you propose to burn methanol when it is 70 parts
24 in 100 or thereabouts.

25 A Yes sir.

26 THE COMMISSIONER: Excuse me.
27 Could you just go back? I was wondering about that,
28 too, and where I didn't follow you the other day was
29 you said that -- forgive me for just taking a moment,
30 Mr. Scott -- you said that you might use the warm

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 water technique for testing the pipe. Then you said you
3 would use a mixture of methanol and water, and you
4 just told Mr. Scott that except at major river crossings
5 you thought that from the 60th Parallel north you'd use
6 the mixture of methanol and water so that your test
7 solution didn't freeze. Now, that mixture, as I under-
8 stand it, is 1% methanol by weight. That is the test
9 fluid. Am I right?

10 A No sir. The test fluid
11 would vary in strength, but 25% methanol by weight, I
12 believe, is an approximation.

13 Q I see. Forgive me, I don't
14 have my notes in front of me. Well, just so that --
15 this panel, I think, is going to leave today and we won't
16 have another crack at this -- somewhere it sticks in
17 my mind, I remember now you did say 25%. Well, where
18 was that 1% ^{by weight} methanol, and why is Mr. Scott now talking
19 about 70%?
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1 MR. SCOTT: I think, Mr. Commiss-
2 ioner, it might be helpful if we asked Mr. Reid to ex-
3 plain the entire process when he begins to distill it,
4 because the one -- or I think this morning it became
5 perhaps two percent is a factor in that as well.

6 WITNESS REID:

7 A Yes. The distillation
8 process, I'm sure you're basically familiar with it
9 all.

10 Q It operates like a still?

11 A Yes. We will be running a
12 large still. The methanol is more volatile than
13 water.

14 THE COMMISSIONER: Now this is
15 to dispose of it after you have tested.

16 A Yes, sir.

17 THE COMMISSIONER: All right.

18 A And after the test fluid
19 has finished its useful life, it is then heated to a
20 point where the methanol -- or when it is heated,
21 the methanol being more volatile tends to evaporate,
22 and this is condensed and comes off the top of the
23 still as the distillate, and it contains -- because
24 of the high volatility of methanol, the solution
25 which you condense contains 70 percent methanol and
26 30 percent water.

27 Q And that -- I see, now.
28 And the methanol is converted to a gaseous state by
29 heating, and then back to a liquid state?

30 A Yes, sir. This is --

1 Q And then when it's back to
2 a liquid state, you have 70 percent methanol?

3 A Yes, sir.

4 Q All right. Now, where did
5 I ever get the one percent notion?

6 A In heating the test fluid,
7 when the methanol leaves the test fluid as a vapour,
8 not all of the methanol does vaporize and can be con-
9 densed. The residue or bottoms created ^{are} a one percent
10 solution.

11 Now, in splitting the two streams,
12 you don't get -- we have approximately 25 percent and
13 75 percent of methanol, water respectively when we
14 mix the two. In creating a 70 percent methanol solu-
15 tion and a one percent methanol solution in the dis-
16 tillation process, the 70 percent methanol solution
17 represents about 40 percent of the test fluid, and the
18 one percent methanol solution represents about 60
19 percent of the test fluid.

20 So you end up with two sort of
21 different volumes. Sixty percent of the test fluid
22 which contains one percent methanol, represents about
23 two percent of the total methanol that was once in that
24 test fluid.

25 THE COMMISSIONER: All right.

26 MR. SCOTT:

27 Q Let me just see if I under-
28 stand. I take it that the point of having 70 percent
29 in the condensed liquid, is that it won't burn at
30 less than that?

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1 A No sir, it will burn in
2 excess of 50 percent.

3 Q All right. Well, you have
4 to have a very high percentage of methanol in the
5 distillate before it will burn, in excess of 50 per-
6 cent?

7 A Yes, sir.

8 Q And optimumly under your
9 arrangement, at 70 percent?

10 A This is not an optimum
11 design, but it's a design I used for the purposes of
12 this study.

13 Q And the process is that
14 when you heat the test material, the methanol/comes
15 off first?

16 A Yes, there is some water --

17 Q Yes.

18 A -- which comes off with
19 it.

20 Q Well that was the next point,
21 and some water comes off with it?

22 A Yes, sir.

23 Q And the reason you don't
24 distill the whole thing is you begin to get too much
25 water in the distillate, and it would run the risk of
26 falling below the burning point?

27 A No, sir. The more you
28 distill it, the more refined the process, the more
29 complete the separation.

30 Q Well then why don't you

1 distill it so there is no methanol in the bottoms?

2 A Because of the nature of
3 the water-methanol relationship in solution. It's
4 extremely difficult to get a very -- well, it's
5 extremely difficult to reduce it below one percent.
6 It could be done if it were absolutely required.

7 Q Are you going to reduce it
8 to one percent or two percent?

9 A The solution will be less
10 than one percent methanol.

11 Q All right. Well, I suppose
12 what I'm really asking is, in the last analysis, how
13 are you certain that it will be reduced to below one
14 percent?

15 A The process used to predict
16 distillation column behaviour is known as the
17 McCabe Theo Process, and this process was used in
18 designing this -- doing the preliminary design of the
19 still, which I included in the application material.

20 Q Well, do we have your assur-
21 ance that the remaining methanol will always be less
22 than one percent?

23 A Yes, sir.

24 Q And do you rely on the
25 mechanism for that, or are you going to use any test-
26 ing device?

27 A The very design of the
28 still and its operation will guarantee that.

29 MR. GENEST: I don't think you
30 have ever made whiskey, Mr. Scott.

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

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1 MR. SCOTT: No, but I have had
2 other uses for it.

3 Q Well, what -- it's guarant-
4 eed, I take it by the machine. Is it going to be
5 monitored in any fashion?

6 A I have not contemplated
7 that.

8 Q Now I take it we fool our-
9 selves when we are talking about a still, don't we,
10 because what we're really talking about is volumes up
11 to one million gallons and perhaps beyond?

12 A Yes, sir.

13 Q Yes. And the one million
14 gallon volume would be for three miles of pipe?

15 A Yes, of that order.

16 Q Well now, I understand from
17 your evidence that in terms of the testing, the process
18 is going to be that you're going to have 25 percent
19 methanol by weight in the solution?

20 A Yes, sir.

21 Q For the purposes of the
22 test?

23 A Yes.

24 Q And that the test is going
25 to be done on three mile sections?

26 A Yes.

27 Q And I think you said,
28 correct me if I'm wrong, that the fluid would be used
29 up to 47 times over again?

30 A Yes, sir.

1 Q Now, over what period of
2 time would it be re-used up to 47 times?

3 A That would be a two year
4 period.

5 Q And I take it then that
6 what is contemplated is that you may not distill this
7 particular batch until it has been used 47 times over
8 two years?

9 A Correct.

10 Q Yes. Well now, in the
11 response to the Assessment Group question 40, you said,
12 and I'll read it to you, your counsel will get it out
13 if you don't have it there.

14 MR. GENEST: The witness has it,
15 Mr. Scott.

16 MR. SCOTT:

17 Q On the last page at the
18 bottom of the last paragraph, indeed the last sentence,
19 after dealing with the way you get one percent, I
20 take it, you say:

21 "In either case the concent-
22 ration of methanol will be too low to be
23 harmful",
24 and by that you refer to below one percent?

25 A Yes sir.

26 Q "No significant amounts
27 of other contaminants will be present in the
28 water, e.g. rust".

29 A Yes, sir.

30 How can you be certain that after

1 retaining it for up to two years and using it 47 times,
2 it will contain no other contaminants?

3 A As Mr. Rathje mentioned
4 yesterday, the pipe will be internally coated with a
5 material which is non-soluble, and we just do not
6 contemplate any other foreign materials getting into
7 that pipe which could contaminate it.

8 Q Well I'm now sold on the
9 non-corrosive nature of the pipe, but we don't have
10 to trouble you about that, but I take it that at every
11 40 foot length where the pipe is welded, there will
12 be a place in the interior of the pipe where it is
13 not coated?

14 A Yes, sir.

15 Q Yes. Well isn't it quite
16 conceivable that at those welds, those girth welds,
17 contaminants may be produced?

18 A I'm not aware of any that
19 will be produced.

20 Q Well what I'm really asking
21 is, can you assure us that there will be no contaminants
22 in the bottom that results after the fluid has been
23 used 47 times over two years?

24 A Certainty I would say is
25 impossible, sir. It's my judgment that there will be
26 no significant contaminants in that water.

27 Q Now that water is going
28 to be sprayed on the ground, or disposed of in some
29 fashion?

30 A Yes, sir.

1 Q Are you going to monitor the
2 bottoms for other contaminants?

3 A I personally have not
4 planned to monitor it. I'm sure our environmentalists
5 would be prepared to respond to that.

6 Q Yes. Do you know of any
7 plans in that direction?

8 A I know of none, but that's
9 not to say there are none.

10 Q Now, Mr. Commissioner, there
11 are some other matters connected with this which I
12 think properly and they have perhaps been referred to,
13 can be dealt with in phase 2, such as the sources of
14 water, the storage of methanol and things of that type,
15 and I propose to defer consideration of those until
16 that time.

17 Well I would like to talk, Mr.
18 Reid, now about emissions from the compressor
19 stations, and I take it whether it is warranted or not,
20 there is a good deal of excitement, at least in
21 the Sudbury and Alberta areas, about the emission
22 of sulphur and sulphur compounds?

23 MR. GENEST: Well, Mr. Scott,
24 that's -- you're comparing a big nickel mine to the
25 emission of a compressor station? Let's not be
26 ridiculous.

27 MR. SCOTT: That's not what I'm
28 comparing at the moment.

29 Q I take it what we're --

30 MR. GENEST:: That is the context

1 of your question and I object to it, Mr. Commissioner.

2 MR. SCOTT: Well, I will withdraw
3 it.

4 Q I take it what we are conc-
5 erned about here is the possible emission from the
6 compressor stations of SO₂?

7 A I believe Mr. Koskimaki
8 can answer your question.

9 Q I'm sorry, I thought it
10 was --

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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 WITNESS KOSKIMAKI: I went
3 into a certain amount of detail with Mr. Anthony on
4 the procedures that we're using. I think I also stated
5 that I hoped to get this work better documented before
6 Phase 2. The levels that we've calculated is ground
7 level concentrations are below those that are stated
8 in the Federal Clean Air Act, and --

9 MR. SCOTT: Are we talking
10 about SO2 just for my purposes?

11 A What we did was assume
12 the worst case, which would be in the limits of the
13 gas specification. The present gas specification reads:
14 "No more than one grain H₂S per 100 standard
15 cubic feet, with no more than 20 grains total
16 sulphur total standard cubic feet. "

17 And using that 20 grains of sulphur we calculated
18 the SO2 out of the stock in the ground level concentra-
19 tions resulting from that.

20 Q Well, I take it what
21 you've told Mr. Anthony is that the results of your
22 computer program will be available later and will be
23 available in Phase 2.

24 A Yes sir.

25 Q Well, now -- I'm sorry.

26 A The only numbers I can
27 give you now is that they are below the Federal Clean
28 Air Act.

29 Q Let me ask you a couple
30 of questions about the compressor stations and about

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 the problems so that I will be prepared to deal with
3 the matter in Phase 2. First of all, how high above
4 ground level are the tops of the stacks at the compres-
5 sor stations?

6 A The level is a little
7 bit flexible. In the calculations we were using a
8 42-foot height for the main compressors, and a 24-foot
9 or 25-foot height for the electrical generation turbine.

10 Q Well now in the appli-
11 cation where it deals with natural gas composition,
12 there is no data for sulphur compound set out, but
13 yet elsewhere in the application it seems to be ack-
14 knowledged that exhaust gases will contain sulphur dio-
15 oxide. That's a fair reading of the document, isn't
16 it?

17 A That is only because
18 the way the present gas specifications read, that
19 I've been furnished with by the producers, and in
20 that they do list that it could be up to 20 grains
21 total sulphur. Now, I understand that was a quite
22 high level and probably won't happen. I'm informed
23 that probably two grains per 100 standard cubic feet
24 total sulphur is a more realistic value.

25 Q Well, would it be
26 correct to say that at least the formal information
27 you have received about gas composition from the
28 producers indicates up to 20 grains?

29 A Yes sir, yes.

30 Q And you understand that

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 in fact it will be substantially less than that two
3 grains.

4 A Well, I was informed that
5 two grains would probably be a more realistic figure.

6 Q And do I understand from
7 you that at the moment at least, that is the limit of
8 your knowledge as to the sulphur composition of the
9 gases that you will be carrying?

10 A That's the limit of my
11 knowledge, yes.

12 WITNESS PURCELL: Mr. Scott,
13 there is another volume of applicant's material that's
14 called the tariff that does contain a gas specification
15 that does limit the amount of sulphur.

16 MR. SCOTT: It limits it to
17 20 grains, doesn't it?

18 A Yes sir.

19 Q Yes, and I take it that
20 that is the outside limit that you've received from the
21 gas company.

22 WITNESS KOSKIMAKI: Yes sir.

23 Q Well, I take it that the
24 other volume to which you've referred indicates or
25 as a result of the other volume it is the position of
26 the applicant that it will not be carrying gas that
27 contains more than 20 grains of hydrogen sulphide.

28 A Yes sir.

29 WITNESS PURCELL: Of total
30 sulphur.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 Q Well now, if the gas
3 should contain more than that, how is it going to be
4 removed and how much is going to be removed at the
5 processing plant? Do you have any knowledge of that?

6 WITNESS KOSKIMAKI:

7 A No sir.

8 Q Mr. Purcell?

9 WITNESS PURCELL: I can't
10 prove it to you, Mr. Scott, but my understanding is
11 that there is very, very little sulphur in the gas.

12 Q Well, I understand that,
13 but you have indicated or the applicant has indicated
14 that he will not carry gas above a certain level of
15 sulphur content. I presume that there is therefore
16 going to be a processing plant of some kind at the
17 north end that will determine the amount of sulphur
18 and if it by any chance should be higher, reduce it.

19 A In my discussions with
20 the producers, I don't believe that they have mention-
21 ed anything about removing sulphur simply because it
22 is at such a low level that there was no need to.
23 I think there are methods for removing it, though,
24 from the gas should it prove to be necessary.

25 Q But I take it that the
26 applicant at least has established no such methods and
27 no such requirements except the general requirement that
28 it will not carry gas that has more than 20 grains.

29 A As part of its contract
30 with the producers, it specifies that the sulphur con-
tent shall not exceed 20 grains.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Bathje, Reid
Cross-Exam by Scott

1
2 Q Well, I understand that
3 but how are you going to find out?

4 WITNESS REID: There are
5 compressor stations -- sorry, measurement stations
6 located at the producer's gate or at the inlet to our
7 pipeline. We have included in the design a monitor
8 which would detect sulphur.

9 Q Is the measuring station
10 owned by the applicant or by the producer company?

11 A Owned by the applicant.

12 Q Well now, if the gas in
13 fact contains more than 2 grains per 100, is that
14 plant going to remove the excess?

15 A No sir.

16 WITNESS PURCELL: The
17 specification is 20 grains, Mr. Scott.

18 Q Well, its 20 grains of
19 sulphur or 2 grains of hydrogen sulphide, isn't it?

20 A I think so, yes.

21 WITNESS KOSKIMAKI: One grain
22 hydrogen sulphide.

23 Q All right, if either of
24 those perchance is exceeded, is the plant going -- is
25 the monitoring plant going to reject the gas or is
26 it going to reduce the component?

27 WITNESS PURCELL: I would
28 speculate that they would have to reduce the component.

29 Q Has Arctic Gas got
30 facilities to do that or is it going to rely on the

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 producers?

3 A It will rely on the producers
4 to meet its contractual obligations.

5 THE COMMISSIONER: You mean
6 their contractual obligations?

7 A Yes sir, excuse me.

8 Q I'm not correcting your
9 English, I just want to understand you correctly.

10 A The producer's obligation.

11 MR. SCOTT: Q So that we can
12 subsequently make an appropriate comparison, I wonder
13 if you can make the following translation for me? If
14 you can't perhaps you can advise Mr. Genest and he can
15 let me know your information subsequently, and I'm
16 concerned about units of measurement, and I'd like to
17 know if 20 grains of hydrogen sulphide per 100 cubic
18 feet is approximately the same as 860 milligrams of
19 sulphur dioxide per cubic meter. Do you know that or
20 do you want to find out?

21 WITNESS KOSKIMAKI: I would
22 have to calculate that.

23 Q All right, it can be
24 calculated, I take it?

25 A Yes sir.

26 Q Yes, and I'd also like
27 to know if the 20 grains of hydrogen sulphide per
28 100 cubic feet is approximately the same as 370 parts
29 per million of sulphur dioxide.

30 A Would you say that again

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 sir?

3 Q 20 grains of hydrogen
4 sulphide per 100 cubic feet, is that approximately the
5 same as 370 parts per million of sulphur dioxide?

6 A I don't think we'll have
7 20 grains of hydrogen sulphide.

8 Q I understand you won't
9 have that, but I take it that you can do the calculation
10 for me so that I will be able to translate one term
11 into the other.

12 A Yes sir.

13 Q Thank you. Now you've
14 referred to the air quality standards of the Clean Air
15 Act, and I want to know what you intended to convey by
16 your assertion that you would comply with the provisions
17 of that Act?

18 MR. GENEST: I don't under-
19 stand that question. What did we intend to convey when
20 we said we would comply with the provisions of that
21 Act?

22 MR. SCOTT: No, the Act
23 stipulates, as I understand it, and tell me if I have
24 misunderstood it, that it lists the maximum acceptable
25 concentration and the maximum desirable concentration
26 of .02 and .01 parts per million respectively.

27 A Yes Sir,
28 that's on an annual arithmetic mean.

29 Q Yes, is it the intention
30 of the applicant to meet that standard with respect to

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 every compressor station?

3 A / It
4 Is the intent to meet
5 that at ground level concentrations.

6 Q I beg your pardon?

7 A At ground level concentra-
8 tions.

9 Q At ground level concen-
10 trations.
11 That, I take it, is on an
12 annual basis.

13 A Yes sir.
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1 Q And do I understand
2 correctly that it is not intended to meet that concen-
3 tration maxima over a long period of time?

4 A We would be under that
5 prolonged period of time, yes, sir. If we are under
6 it for a one year period, we are under it for every
7 year for the next 30 years.

8 Q Now have you anywhere, a
9 report that sets out the characteristics and the
10 input parameters of the computer program? That could
11 be made?

12 A That is going to be con-
13 tained in my revision to Section 6 of the Preliminary
14 Station Design Report, sir.

15 Q Yes. Is it possible for
16 us to get a copy of that before the final report is
17 made available?

18 A Yes, sir.

19 Q Well now, do you agree that
20 the result reported in the transcript at Volume 31,
21 page 3950, in which higher ground level concentrations
22 of sulphur dioxide were predicted for windy days,
23 is contradicted by the common temperature inversion
24 conditions that are well known in the case of ice
25 fog. Isn't there an inherent contradiction in those
26 two things?

27 A The -- I'm not too familiar
28 with these inversion conditions. The observations we
29 have made from looking at the computer output is that
30 it's on the windy days that we get the highest

1 ground level concentrations.

2 Q Well doesn't that result
3 surprise you? That on windy days the ground level
4 concentration is the highest?

5 A No sir, because the wind
6 forces the stack emissions to come back to the ground
7 very rapidly. On non-windy days, you have a high
8 thermal rise factor and a velocity rise factor, which
9 lifts the effective stack height to quite a high ele-
10 vation, and then by the time it reaches the ground
11 it's pretty well dispersed.

12 Q It's suggested to me that
13 in fact the result would be expected to be the other
14 way around. Do you have any comment to make on that?

15 A That hasn't been my obser-
16 vation from the computer output.

17 Q No I understand that it
18 hasn't been the result of the computer analysis, but
19 it's suggested to me that the result that you have
20 reported on is sufficiently inconsistent with what is
21 known that it casts some doubt on the validity of the
22 computer program. Have you any observation about
23 that?

24 A The computer program is
25 one that was written by the Alberta Department of
26 Health, and that was in 1969, and subsequently it was
27 taken over by the Alberta Department of the Environ-
28 ment, and they accept this program.

29 Q Well that doesn't neces-
30 sarily instill us all with confidence, but what I'm

1 really getting at, is do you see anything in the result
2 that you have reported, that leaves you with reservat-
3 ions about the validity of the computer program? Any
4 reservations at all?

5 A Well I stated before that
6 I couldn't justify to the theory behind the program.
7 I used it because it was an accepted method by the
8 Alberta Department of the Environment.

9 Q And I take it what it comes
10 down to is this; that you personally aren't in a
11 position to speak to the validity of this program?

12 A That's right.

13 Q We would particularly ask
14 you to determine before phase 2 if you can, and report
15 to your counsel, whether the computer program makes
16 any allowance for inversion factors?

17 A Yes, sir.

18 Q Perhaps you can take a note
19 of that.

20 A Yes sir.

21 MR. GENEST: Well does that
22 require us to go to the Alberta government, do I
23 understand that correctly, or --

24 A Pardon me?

25 MR. GENEST: Does that require us
26 to go to the Alberta government?

27 MR. SCOTT: Well, I take it,
28 Mr. Commissioner, that the applicant is relying on a
29 program prepared by somebody else to predict the
30 residue sulphur around these plants. That's fine, but

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 what we're concerned about is to know whether it con-
2 tains any recognition of this factor.

3 As my friend is using the pro-
4 gram, I take it that his clients could quickly find
5 that out for us.

6 MR. GENEST: Can I make a note
7 of that to make sure I understand what you want, Mr.
8 Scott? It's whether the --

9 MR. SCOTT: If you do, would
10 you let me know?

11 MR. GENEST: -- whether the
12 computer program --

13 MR. SCOTT: Takes account of any
14 inversion factors?

15 MR. GENEST: All right.

16 MR. SCOTT:

17 Q Mr. McMullen, I understand
18 from your evidence that the microwave proposal, the
19 microwave communication proposal has approximately or
20 more than a hundred repeater stations in Canada, and
21 more than 50 in the Territories?

22 WITNESS MCMULLEN:

23 A That's correct, yes.

24 Q And all of those are re-
25 quired for the system to be utilized?

26 A That's correct.

27 Q Now what happens if one of
28 those towers fails?

29 A If one of the towers fail,
30 let's say a location in the south, the communications

1 to the north of that will be lost, to the stations
2 north of that.

3 Now, we have two alternatives
4 available to us. The first is to quickly repair the
5 repeater site, and the second is to arrange for alter-
6 nate circuits, that is circuits that go over the
7 other facilities in the north.

8 Q I take it that you have to
9 have some kind of stand-by system, or you're not going
10 to be able to make the communication if you use micro-
11 wave?

12 A Yes, there is a stand-by
13 system proposed, a repeater which can be quickly
14 moved in.

15 Q Well let me understand.
16 Let us assume that a microwave tower falls down or is
17 blown down in the Territories, what are you going to
18 do?

19 A The first thing that would
20 be done is to arrange for alternate circuits for the
21 data from the compressor stations to the gas control
22 centre.

23 Q Well what are those alter-
24 nate circuits?

25 A These alternate circuits
26 would be over the existing -- pardon me, the tele-
27 communications system which will be in existence by
28 1976.

29 Q Well you are talking about
30 the public communication system?

1 A That's correct.

2 Q Well, before we get to that,
3 if this tower blows down, I understood you to say that
4 you had two remedies: One is to build it again and
5 put it back --

6 A Right.

7 Q -- and the second is, in
8 the meantime, to use the public communication system?

9 A Correct.

10 Q All right. Well now, what
11 is the time factor involved in restoring a microwave
12 tower that is -- that either falls down or is destroyed
13 in a remote area?

14 A Restoring the microwave
15 or the repeater tower?

16 Q Yes, so it can be utilized
17 fully?

18 A A temporary structure can
19 be put on site within five days at the most. There
20 are other times, of course minimum that would be less
21 than a day.

22 Q And what is the time lag
23 for repair, that is for complete restoration of the
24 system in a remote area in the Territories? Not
25 restoration of the service, restoration of the
26 system?

27 A Of the control system?

28 Q Yes, of the tower.

29 A Of the tower?

30 Q Yes?

1 A Well, in the first instance
2 I was speaking of a temporary --

3 Q Yes.

4 A -- tower, and equipment.
5 Now, in order to completely restore the system, you
6 would have to re-order a new tower and acquire the
7 buildings and whatever else is damaged of the micro-
8 wave equipment. You are looking at something in the
9 order of probably three to four months.

10 Q Well now at least in the
11 period before the temporary tower is installed, the
12 alternative is to rely on the public system?

13 A That's correct.

14 Q Yes. Isn't it quite likely,
15 Mr. McMullen, that at that moment when you move to the
16 public system as a replacement, you do so at a time
17 when there have been heavy storms or high winds or some
18 phenomena like that?

19 A Yes, this has been the
20 common case.

21 Q Yes, and isn't that likely
22 to be a period of time when the public system is itself
23 under stress and runs the risk of damage?

24 A That's possible.

25

26

27

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29

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Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 Q I take it that none of
3 these problems arise if you use Anik.

4 A In the case of the
5 ~~satellite~~ system, if one of the earth stations associa-
6 ted with a compressor station is -- becomes -- goes
7 out of service, it does not affect any of the others.

8 Q So that Anik doesn't
9 present the kind of problems that you and I have
10 been talking about.

11 A No sir.

12 Q Do you know when it is
13 likely that a decision will be made as to which communi-
14 cations route the applicant proposes?

15 MR. GENEST: I suggest that
16 be put in the Mr. Horte bag, I think, Mr. Commissioner, that
17 is a matter of policy.

18 MR. SCOTT: Q Well now, Mr.
19 Purcell, there was some talk about automatic welding
20 in the field to replace or partly replace manual
21 welding of the girths. I understand that you indicated
22 that Aleyeska intends to use automatic welding.

23 WITNESS PURCELL: Mr. Holmberg
24 was speaking to that, Mr. Scott.

25 Q I'm sorry.

26 WITNESS HOLMBERG: Yes, the
27 information I have is that Aleyeska made tests last
28 year welding up approximately four miles of 48-inch
29 pipe. This was welded into lengths about, as I
30 understand it, about 15 lengths, and then end caps or

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 heads were put on these, to use these 15-foot lengths
3 -- tanks, really, as fuel storage tanks. I have been
4 further advised that Aleyeska has approved the use of
5 automatic welding. This is what they call the C.R.C.
6 welding, and that equipment for two spreads is presently
7 being shipped to Alaska for use.

8 Q Well now, do you
9 understand whether Aleyeska is doing any further tests
10 on automatic welding?

11 A I don't have the details
12 but I do know that I understand that they have been
13 doing extensive testing in the past year.

14 Q And that they are still
15 testing? Do you know anything about that?

16 A I think several weeks
17 ago they made a definite decision that they would go
18 ahead and use the automatic welding. Now that's not
19 being used exclusively, but they have -- according
20 to the information I have is that they are getting
21 equipment for two spreads.

22 Q Is the applicant doing
23 any tests with respect to automatic welding?

24 A Yes. We have furnished
25 C.R.C. as well as other potential manufacturers of
26 automatic welding equipment, we have furnished them
27 pipe complying with our specifications. They have made
28 tests and -- or made welds, and these welds are
29 presently being tested.

30 Q They are being tested by

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 them rather than by you?

3 A They are being tested
4 by several commercial laboratories, and we have also
5 shipped one of these welds over to England to have
6 some special tests made.

7 Q What are the uncertainties
8 involved in the automatic welding process about which
9 you're concerned when you look at the tests.

10 A The uncertainties are
11 partly with respect to the equipment itself, being able
12 to withstand the cold climates. This is where Aleyeska
13 has played an important part and was one of the main
14 reasons for the test last year. As far as the welds
15 themselves are concerned, I would say the greatest
16 matter of concern has been the amount of heat input
17 and whether this would result in excess hardness at
18 the outer edge of the weld. Now this can be corrected
19 by several techniques, and there have been tests made trying
20 to determine the most reliable techniques in this
21 respect.

22 Q In one sentence, if it's
23 possible, what is the consequence of that? The
24 excess hardness.

25 A The consequence is that
26 the harder material would be susceptible to developing
27 cracks, and of course that's undesirable.

28 Q Is there any concern about
29 the rate at which the welds can be completed under the
30 automatic system?

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 A Actually the faster the
3 weld can be completed, the more desirable it is. That
4 is you'd like to retain as much of the heat input from
5 welding as you possibly can.

6 Q I understand that, but
7 is there any concern about whether the automatic
8 welds can in fact meet the required timetable?

9 A This has been investi-
10 gated and this does not appear to be a problem.

11 Q Are you referring --

12 A We have some requirements
13 that if they fail to meet the requirements, as far as
14 retaining heat, of requiring, for example if there is
15 a delay or anything of that type, well we require what
16 we call pre-heating before welding is resumed.

17 Q Is there any uncertainty
18 in connection with the size and thickness of the pipe
19 to be welded in this case?

20 A No.

21 Q If the applicant were to
22 depend on manual welding, is there any problem about
23 obtaining welders, or is this panel able to judge?

24 A I think it's beyond this
25 panel, but we have discussed this in the Metallurgical
26 Committee and we think it will be a problem.

27 THE COMMISSIONER: Does that
28 have anything to do with the consideration to be given
29 to automatic welding?

30 A It's a reason for being

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 interested in having automatic welding.

3 MR. SCOTT: I take it from
4 something either you or Mr. Purcell said earlier,
5 moving to automatic welding even partially is not
6 likely to reduce the work force, though it will reduce
7 the component of welders. Is that correct?

8 A Yes, that's essentially
9 correct.

10 Q What are the other people
11 who -- what are the skills of the other people who
12 will be hired to replace, if I can use that phrase,
13 the manual welders when automatic welding is used?

14 A Automatic -- let me back
15 up just a little bit. As a result of the interest shown
16 in automatic welding, I've been in touch with the C.R.C.
17 Welding Company in Houston, who is furnishing this
18 equipment to Aleyeska, and hope to have information
19 available for Mr. Dau next week. They have a moving
20 picture that's available showing the operation of this
21 equipment, and if we can make the proper arrangements
22 we're going to try to get this film up for next week.
23 In talking to them, the number of welders, they have
24 used this equipment on at least three big welding
25 jobs in which they used what they referred to as
26 non-skilled personnel, that is personnel that were not
27 welders. This was a line in West Texas, a line in
28 Italy, and a line in Holland. Their experience is
29 that they can train men to operate this automatic
30 welding equipment much more quickly than you can train

Purcell, King, Koskimaki, Holmberg
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Cross-Exam by Scott

1
2 welders, and if automatic welding equipment is used
3 it will probably -- it's expectation would be that it
4 would increase the use of local labor, rather than
5 decrease the use of local labor.

6 Q Is that unskilled
7 labor?

8 A Unskilled labor, that
9 is they would have to be trained, but they would not
10 have to be given an extensive training program to
11 become skilled welders. There's a lot of personal
12 skill in welding and it takes much longer to train
13 a manual welder than it takes to train a man that
14 is essentially pushing buttons and making adjustments.
15 He can be trained rather quickly to do this type of
16 work.

17 Q Would it be fair to
18 say generally speaking then that the loss that -- to the
19 manual welders is in substance made up for by the
20 fact that unskilled persons trained -- will then be
21 trained to operate the automatic equipment will offset
22 the loss in numbers.

23 A That's right.
24 The information, if I can find my notes here --

25 Q I don't want any more
26 information, that's good enough for me if that's the
27 fact.

28 A O.K.

29 MR. GENEST: I thought Mr.
30 Commissioner had indicated --

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Cross-Exam by Scott

1
2 MR. SCOTT: I'm sorry, I
3 apologize.

4 MR. GENEST: - considerable
5 interest in that subject. While Mr. Holmberg is here,
6 it might be useful to have it.

7 WITNESS HOLMBERG: Well,
8 I'm hoping that we will be able to get this film up.
9 I've seen this film and it's very explanatory, and
10 I think would be very helpful in understanding how
11 the equipment works and the number of men used. It
12 isn't a case of having one man that's making the complete
13 weld. It actually involves quite a compliment of men.
14 It varies depending upon the number of these units they
15 use in sequence to make a weld; but it will involve
16 a large number of men to operate this equipment.

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Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 THE COMMISSIONER: When you are
2 using manual welders, as I understand it, there are a
3 series of welds made at each join, so that you have
4 teams of welders?

5 A That's right, and you'll
6 have essentially the same type of thing here with the
7 automatic welding.

8 Q So you would have the same
9 number of welds by a series of machines?

10 A Yes. And each machine
11 requires operators.

12 MR. SCOTT:

13 Q Two other questions. First
14 of all, Mr. Purcell, are you familiar with the term
15 liquefaction as it relates to earthquakes?

16 WITNESS PURCELL:

17 A Yes sir, in a general
18 sense.

19 Q Would I be correct in the
20 most general sense, to say that the process at stake
21 is one in which the earthquake induces
22 the earth to almost sort of liquefy and act like
23 jelly?

24 A That's my understanding.

25 Q Yes. Now, in a report
26 called "Design Criteria for Canadian Arctic Gas Pipe-
27 line" by Dr. N.M. Newmark, he makes a comment --
28 are you familiar with that report, first of all?

29 A I have looked at it at one
30 time, I haven't seen it recently.

Holmberg, Purcell, King, Koskimaki,
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1 Q Yes. At page 45, under
2 the heading "Liquefaction Potential", he says this:

3 "One of the most serious
4 consequences of an earthquake is the effect
5 of changing the properties of inundated
6 sands or cohesionless materials so that they
7 become 'quick' or develop a liquefied con-
8 dition".

9 And at page 50,

10 "Liquefaction problems also
11 are expected to be of importance in Zones A
12 and B",

13 and I will have to tell you that ^{he} defines Zones A and
14 B to be part of the route along the west side of the
15 delta, being Zone A, and the route westward from the
16 delta on the north slope and eastward from McPherson
17 to the Mackenzie River as being B.

18 Now what I want to ask you is,
19 in your design, have you made any allowance for this
20 particular problem?

21 A This is primarily a geo-
22 technical problem. I assumed you discussed it with
23 Dr. Clark?

24 Q Well you're quite wrong.

25 A The behaviour of soils is
26 a geotechnical problem.

27 Q Yes. Does this illustrate
28 that what has essentially happened here is that the
29 design group have designed the pipe according to the
30 conditions that have been laid down by Arctic Gas,

1 and then simply handed it over to the geotechnicians
2 and said "Now bury it and make sure it doesn't come
3 up"?

4 A Overcoming liquefaction is
5 certainly a geotechnical consideration. There's no
6 input from this group into that.

7 Q And would it, as a general
8 principle be true, that in designing a pipe, you have
9 really had no geotechnical input as such, because those
10 problems are theirs that they will solve when they get
11 the pipe on the ground?

12 A I think there are two major
13 effects of a seismic event. One is to induce stresses
14 into the pipe steel.

15 Q Yes.

16 A Now we've looked at those
17 and we've found them to be very minor.

18 Q Have you made any modi-
19 fications as a result of that?

20 A It was^{not}/necessary. And the
21 other effect is upon the way the ground behaves, and
22 how it holds down the pipe, how its hold-down ability
23 is lessened, --

24 Q Yes.

25 A -- under liquefaction and
26 that's something that's completely out of our
27 province.

28 Q But to come back to my
29 apartment example, this isn't a case where the geo-
30 technicians gave you the data about the ground and

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Cr. Exam. by Scott

1 then said "Design a pipe that will respond to the
2 problems"?

3 A I'm sure if they had any
4 concerns with liquefaction that they couldn't overcome
5 with their techniques, they would have come to us to
6 explore ways of overcoming it with the pipe, but that
7 has not happened.

8 Q Yes. Is there any problem
9 which you recall, that the geotechnicians have brought
10 to you that have led to a modification in the pipe?
11 By the designers?

12 A Not in the piping. They've
13 caused us to move compressor stations.

14 Q Oh, leave the compressor
15 stations aside for the moment, if we may, and let's
16 just deal with the pipe. Have they brought any pro-
17 blem to you that has led to an alteration of the
18 design of the pipe?

19 A No sir, not if you include
20 weighting and anchoring and things of that nature
21 within their responsibility.

22 Q Yes. Those are all the
23 questions I have. Thank you, Mr. Commissioner.

24 MR. GENEST: There are a few
25 questions in re-examination, Mr. Commissioner.

26 THE COMMISSIONER: Excuse me?
27 Coffee's ready?

28 MR. GENEST: I beg your pardon,
29 sir?

30 THE COMMISSIONER: I'm talking

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
ReDirect Exam.

1 to Miss Hutchinson, forgive me.

2 THE COMMISSIONER: Well you've
3 just got a few questions, and then we can adjourn to
4 hear this motion.

5 MR. GENEST: Yes, I can complete
6 mine in a very few minutes.

7 THE COMMISSIONER: Well go ahead
8 then.

9
10 RE-DIRECT EXAMINATION BY MR. GENEST:

11
12 Q I wanted to ask Mr. Pur-
13 cell, arising out of some cross-examination by Mr.
14 Gibbs and by Mr. Scott, what work was done by your
15 department of Northern Engineering Services to assist
16 the applicant, Canadian Arctic Gas, in making the
17 decision that the line should be of a 48 inch size?

18 A Or other sizes?

19 Q Or other sizes, that's
20 right.

21 A We did a series of studies
22 which we called optimization studies. I think there
23 are three examples of these reports in our list of
24 relevant documents. There is one more current one on
25 our list of documents on which we rely in the list
26 that was attached to our prepared evidence.

27 What we do when we make these
28 studies is take a series of pipe sizes, we perhaps
29 would take 36 inch and 42 inch and 48 inch and larger
30 pipe sizes. We in some cases take different types of

1 compressor stations, and apply them to each of the pipe
2 sizes over a range of volumes, to determine how many
3 compressor stations are required over a range of
4 volumes with each of the pipe sizes.

5 Then within the responsibility
6 of this group we develop material costs for pipe and
7 for compressor stations, and the report is prepared by
8 this group, so in the process of preparing the report,
9 we gather information on construction costs and we
10 make a simplified version of the financial analysis
11 that is produced by the Canadian Arctic Gas people,
12 and we produce series of curves that reflect the cost
13 of transportation versus the flowing gas volume for
14 each of these pipe sizes.

15 So a person can look at the curves
16 and determine from them what the optimum volume is,
17 the curves are shown often on the same page, so a
18 person can look at one page and see what the optimum
19 volume is for two different pipe sizes, and see what
20 the relative cost of service is for those two pipe
21 sizes.

22 THE COMMISSIONER: Cost per
23 billion cubic feet or whatever unit of measurement
24 you use?

25 A Yes, sir. And the purpose
26 of bringing this up, I think, is just to show that Mr.
27 Horte didn't make decisions as to pipe size in a
28 vacuum, that he had input from us as to the financial
29 effects of various pipe sizes at various volumes and
30 he put them together with these other considerations

Holmberg, Purcell, King, Koskimaki,
McMullen, Reid, Price, Rathje
Re-Direct Exam.

1 to arrive at a decision.

2 MR. SCOTT: Could I ask my friend
3 if in due course, not today perhaps, he can identify
4 for us the location of these curves so that we can
5 have access to them?

6 MR. GENEST: Can you help us
7 right now, Mr. --

8 THE COMMISSIONER: Do you have
9 them numbered?

10 A I don't have a numbered
11 list. I have a reference on the list that was
12 attached to our prepared evidence.

13 MR. SCOTT: That will help.

14 WITNESS PURCELL:

15 A It's on page 4 near the
16 bottom of the page under the heading "Williams
17 Brothers Canada Limited Northern Engineering Services
18 Company Limited". The title of the report is
19 "48 and 56 Inch Optimization Studies". The date is
20 July, 1972.

21 MR. GENEST:

22 Q Next, Mr. Koskimaki, there
23 was some discussion with you in cross-examination
24 relating to some extra silencing and the possibility
25 of inserting extra silencing at compressor stations,
26 and I believe the effect of your evidence was that you
27 might be able to reduce, to take further measures to
28 reduce the level of noise emission, and I wanted to
29 ask about the economic considerations that would enter
30 into making some extra silencing, or providing that

1 extra silencing. Do you have any comment to make on
2 that?

3 WITNESS KOSKIMAKI:

4 A The --

5 Q Does it -- what I'm after,
6 does it have economic consequences?

7 A Yes sir, the condensers are
8 the single most expensive item to silence. The reason
9 for that is you have to add in approximately 25 percent
10 additional condensers to make up for the decrease in
11 air flow caused by the reduced tip speed of the fan.
12 And the cost of those condensers would be in the neigh-
13 bourhood of \$750,000 per station.

14 The turbines themselves, the main
15 compressor turbine, propane compressor turbine, and
16 the electrical generators would probably cost in the
17 neighbourhood of \$100,000. I'm not quite sure of
18 that number, but it's approximately that.

19 In addition, you need a little
20 larger station site and more gravel, and then the
21 additional construction costs to add in these cond-
22 ensers. Now, the material costs themselves I think --
23 you also need around 250 KW more electrical
24 generation, so for the material costs, I think it
25 would be in the neighbourhood of \$900,000.00 per
26 station, and plus whatever costs there is for the
27 extra gravel and the larger plot or station site,
28 and the construction.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Re-Examination

1
2 Q What is the advice
3 that you have from your environmental people as to the
4 acceptability of the presently designed noise levels?

5 A In discussing
6 the design noise levels with them, they felt that those
7 levels wouldn't give them any problems.

8 Q Thank you. Next, Mr. Reid,
9 in response to a question by Mr. Scott this afternoon,
10 about warm water testing, I believe you said that you --
11 at least I understood you to say that the fish biologist
12 would have an absolute veto over the method of testing.
13 Did you mean by that to exclude the decision making
14 powers of the applicant?

15 WITNESS REID: Certainly not.

16 THE COMMISSIONER: Well, let's
17 leave it there.

18 A I'm not aware of the
19 final review process which will be used, and therefore
20 I don't think I should comment on that.

21 MR. GENEST: All right, I have
22 one further question of Mr. Holmberg.

23 MR. SCOTT: Mr. Commissioner, just
24 before
25 / we leave it right there, I take it that the witness
26 stands by the proposition that while Mr. Horte of
27 Arctic Gas may have some other considerations, that
28 insofar as this panel is concerned or as far as Mr.
29 Reid is concerned, the fish biologist will be the
30 one to listen to, except if Mr. Horte or Arctic Gas
overrules them.

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Re-Examination

1
2 A No sir, I don't think
3 that's true. I would assume that the review process
4 would be very similar to a review process that would
5 -- that have occurred in the past, and a mutual
6 agreement would be reached.

7 MR. SCOTT:

8 That's what I'm rather
9 worried about, Mr. Chairman. Mr. Commissioner, the
10 point of it is that in the applicant's statement there
11 are five factors. What I was anxious to ascertain is
12 not whether Mr. Horte could not overrule; he obviously
13 can, subject to any regulatory tribunal, but when it
14 came to hot water testing the dominant factor to the
15 predominance of the others was going to be the view
16 of the fish biologist.

17 A I couldn't really say
18 who would be predominant, sir. I think a mutual agree-
19 ment would be reached, as in all the last review
20 processes.

21 THE COMMISSIONER: Well, at
22 any rate, we understand that you don't stand at the
23 apex of the decision-making process of Arctic Gas.

24 A I am not aware of any
25 review process that has been established, and whether
26 or not anybody, for example, would have a veto power.

27 MR. GENEST: I imagine there
28 will be a considerable discussion of that in the
29 matter of these hearings later on, sir.

30 Q I have a final question,
Mr. Commissioner, for Mr. Holmberg, arising out of

Purcell, King, Koskimaki, Holmberg
McMullen, Price, Rathje, Reid
Re-Examination

1
2 cross-examination this morning by Mr. Scott, and I
3 want to ask Mr. Holmberg, is there anything about --
4 we were talking about the frost bulb, the presence
5 of the frost bulb, and its influence on fracture
6 propagation. Is there anything about the presence
7 of the frost bulb that increases the likelihood of
8 fracture propagation or reduces the efficiency of
9 the arresting bands, in your judgment or opinion?

10 WITNESS HOLMBERG: No, there
11 isn't.

12 Q What is the effect, if
13 any, of the frost bulb in that respect?

14 A I would anticipate the
15 effect of the frost bulb to be beneficial in restrict-
16 ing the opening up of the fracture and result in any
17 fracture that would develop being shorter.

18 MR. GENEST: I have no further
19 questions, Mr. Commissioner.

20 THE COMMISSIONER: Well, any
21 further questions for this panel? Well, I want to
22 thank you, Mr. Purcell and Mr. Holmberg and your
23 colleagues for coming along and spending so much time
24 with us. I'm sorry that this may mean that you have
25 difficulty getting a plane this afternoon, but I
26 invite you to stay for a cup of coffee.

27 (LAUGHTER)

28 MR. GENEST: They've already
29 learned to love Yellowknife.

30 THE COMMISSIONER: We all have.

1 So thank you again, and I suppose we may see some of
2 you again before this Inquiry is completed. But we
3 do appreciate all that you have told us. So we will
4 adjourn for a few minutes and then we will hear that
5 argument about the corridor phase.

6 (WITNESSES ASIDE)

7 (PROCEEDINGS ADJOURNED)

8 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

9 THE COMMISSIONER: Yes, Mr.
10 Anthony?

11 MR. ANTHONY: Mr. Commissioner,
12 perhaps I can start by indicating why this application
13 is being brought before you and by whom.

14 By agreement between or amongst
15 the counsel, which I understand was conveyed to you
16 and with which you concurred, we decided that the
17 corridor evidence be treated as a phase in the hearing
18 and at a separate phase within the hearing. The
19 question of when this evidence should come before the
20 Inquiry, I think, has been on every meeting of the
21 agenda of counsel for months, and because of C.A.R.C.'s
22 involvement in the study of the corridor concept, we've
23 agreed to be the applicant to you, what is in fact
24 a request for directions and instructions as to how
25 you wish us to proceed.

26 The application, if it is
27 such, is in fact concurred in or brought before you
28 by both the Foothills, the Brotherhood and Metis
29 Association, the Inuit Taparasit and Cope and the
30 council of Yukon Indians, and while they may have

1 some variations on what they would like to see
2 happen, the application certainly is before you for directions,
3 certainly ^{is} /supported by those organizations.

4 The proposal we put forward
5 is that the corridor phase be -- the evidence relating
6 to the corridor phase be presented at the end of the
7 Phase 1, construction and engineering, and prior to
8 the Phase 2, which gets into the environmental impact.
9 Now I propose to discuss just briefly the issues that
10 we feel that would be raised and discussed in this
11 phase, and then the argument as to why it should go
12 at that point in the hearing.

13 Mr. Scott in a letter to me,
14 and I believe to other counsel, had requested that we
15 define or give an indication to you to assist you
16 this afternoon / ^{indicating what} issues we would expect the applicant
17 to present evidence on in the corridor phase, and also
18 what sort of issues we may wish to discuss ourselves.

19 I am prepared to outline
20 briefly the issues that I think the applicant should
21 address. The question of the evidence and so on, of
22 course is entirely within Mr. Genest's discretion.
23 With respect to the issues, though, I would suggest
24 that they have been clearly set out to us, in the
25 pipeline guidelines, 1972, and in particular paragraph
26 3 on page 10.

1 I suggest this is a good starting
2 point, because it capsulizes what evidence with respect
3 to corridor the government has referred to this
4 Inquiry under the terms of the Order-in-Council. In
5 it, and I merely just want to paraphrase for brevity,
6 but they suggest that the applicant be required to
7 provide, along with his application, an assessment
8 of the suitability of the applicant's route for nearby
9 routing of the other pipeline in terms of the environ-
10 mental, social and terrain engineering consequences of
11 the other pipeline, and the combined effect of the
12 two pipelines. And parenthetically making it clear
13 that full engineering proposals concerning the other
14 pipeline are not required.

15 And secondly, an assessment of
16 the environmental social impact of both pipelines on
17 nearby settlements or nearby existing or proposed
18 transportation systems.

19 And thirdly, a comparison of the
20 applicant's proposed routes with alternative pipeline
21 routes in terms of environmental and social factors,
22 as well as technical and cost considerations.

23 Without going into too great
24 detail, I might suggest that looking at that third
25 sample there, you can almost see our phasings,
26 currently within the hearing, reflected there
27 with the environmental, social and then what the first
28 phase, the technical and cost considerations.

29 I think it's important to note
30 though, that the guideline speaks, as far as requirements

1 of the guidelines are concerned, that the evidence that
2 the applicant is required to provide, it speaks from
3 the time of the application.

4 Now, while I'm sure Mr. Genest
5 will want to and the Inquiry I'm sure would demand
6 that we have the most up-to-date evidence and inform-
7 ation about these various issues, and we certainly all
8 would want that, I think the problem of evidence
9 continually becoming available to us is a common
10 problem, with respect to the whole gambit of issues
11 being presented to you -- witness the route changes
12 and the 42 inch alternatives and so on.

13 Mr. Scott also suggested that we
14 indicate the type of evidence that should be forth-
15 coming in that phase, and perhaps the best indication
16 I can provide of what our perspective ^{is} is/by looking
17 at the responses to the pipeline application assessment
18 group, response number 14 on page 14-4 -- paragraph
19 4.4 and 4.5. Perhaps to assist the other counsel who
20 don't have a copy, I may just read those two para-
21 graphs so we have it before us. 4.4 reads:

22 "The details of final design
23 for the oil line would have to be known to
24 determine if there were any problems to be
25 expected by juxtaposition of the oil and
26 gas pipelines".

27 THE COMMISSIONER: Now, this is
28 a response by Arctic Gas to a question from the pipe-
29 line application assessment group?

30 MR. ANTHONY: Yes. Their

1 information acquired is that they suggest the applicant
2 be asked to respond in greater detail to corridor guide-
3 line number 3, sub 1, which was the guideline that I
4 referred you to just previously.

5 THE COMMISSIONER: Yes.

6 MR. ANTHONY: And in response to
7 that, the applicant says, continuing,

8 "During the Mackenzie Valley
9 Pipeline study" --
10 which is a study of the oil pipeline,

11 "-- applicant met not only with
12 Mackenzie Valley Pipeline concerning the oil
13 line location, but also with the Department of
14 Public Works concerning the location of the
15 road. Meetings with the latter continue to
16 the present.

17 It is pertinent to note that the
18 three groups were able to adjust their respective
19 routes to accommodate the location of the two
20 pipelines and the highway at that time, and
21 if an oil pipeline were to become an active
22 issue again, its planning would have to be
23 more fully developed" --

24 Sorry --

25 "...were to become an active
26 issue again, its planning would have more fully
27 developed gas pipe and highway facts to which
28 to accommodate, particularly since the locat-
29 ion and construction of the highway are proceed-
30 ing ahead of the gas pipeline. The design of

1 the gas pipeline has accommodated itself to
2 this, and the applicant from its consider-
3 ations of the matters raised in Corridor
4 Guideline 3 sub 1, believes that a warm oil
5 pipeline can be accommodated in the Macken-
6 zie Valley corridor.

7 It is assumed in reaching
8 this conclusion that the designers of the
9 warm oil pipeline will take into account
10 the existence of the chilled natural gas
11 pipeline, and as noted, the applicant would
12 expect to keep informed of design consider-
13 ations of this fact."

14 Paragraph 14.5:

15 "The applicant believes that
16 the socio-economic effects of its project
17 would be highly favourable overall as ex-
18 plained in its submission. There will be
19 temporary adjustments required of Northern
20 peoples as development progresses, but
21 these adjustments have begun anyway in
22 light of general societal change, but with-
23 out the sound economic base which makes
24 such transition and adjustment more
25 feasible. The applicant's project and the
26 economic activities allied thereto will
27 provide that basis.

28 The applicant's prelimi-
29 nary view is that an oil pipeline and its
30 allied activities would clearly augment

1 such desirable effects. Careful planning
2 of location of ancillary oil pipeline
3 facilities and operations would be neces-
4 sary of course, but applicant sees no reason
5 to believe that that would not be done.
6 At present it appears that the two pipelines
7 could make common use of some facilities
8 such as docks, roads, air strips and stock-
9 pile sites, and/some of the societal
10 infrastructure. Local business opportunity
11 would obviously increase as economic
12 activity increased.

13 Finally, applicant submits
14 that the precise route selected for a pipe-
15 line or the relative juxtaposition of two
16 pipelines are basically less important from
17 a socio-economic point of view than the
18 existence of the enterprises, the location
19 of the living and operating sites for per-
20 sonnel which can be done without precise
21 relation to exact route, and policies for
22 dealing with employees and other local
23 peoples".

24 THE COMMISSIONER: You know, if
25 a witness ever comes along here and uses the express-
26 ion "societal infrastructure", I intend to ask him
27 to define it.

28 MR. ANTHONY: I would listen
29 with great interest to his response.

30 MR. GENEST: They speak of nothing

1 else. The University of Toronto.

2 THE COMMISSIONER: Well carry
3 on, Mr. Anthony.

4 MR. ANTHONY: We will keep away
5 from that.

6 The reason for reading that, Mr.
7 Commissioner, is merely to outline the nature of the
8 investigations which the applicant has already carried
9 out, and which it indicates it has carried out in
10 fulfilling the pipeline guidelines. Also to indicate
11 that there are a number of conclusions that the
12 applicant has reached as a result of these researches,
13 the ability to accommodate the two lines within the
14 valley, socio-economic effects, planned joint use of
15 facilities and so on. And I think that how these
16 conclusions were reached, and the evidence available
17 for these conclusions which they've already reached,
18 is the/^{sort} of the evidence I would think that the appli-
19 cant would be interested in presenting, and the sort
20 of issues that we would want to address ourselves
21 to in this phase.

22 Again at the request of Mr.
23 Scott, I also provided a statement as to the evidence
24 that C.A.R.C. may wish to present in fulfilling its
25 obligations to this Inquiry in the corridor phase,
26 and if you have that submission before you, I really
27 -- I have tried to capsulize the sort of issues that
28 you may wish to address.

29 Now the first section there,
30 "Corridor Concept" was in fact -- I would think a

1 fairly brief section of the presentation, which is
2 merely to define what we mean -- the applicant may
3 have a very different idea, but what we mean by
4 corridor, and why it's important as a planning
5 instrument in the development of Mackenzie Valley,
6 and secondly to give an indication of what sort of
7 things already exist in the valley that condition
8 the establishment of a corridor, and this has already
9 been referred to in fact when Mr. Dau said that
10 location of the Mackenzie Valley barging facilities
11 is fairly set.

12 This -- Sections B and C ,
13 dealing with the transportation systems and the alter-
14 nate routes, I think, are probably the core of the
15 evidence. Under Section B of "Transportation Systems",
16 I would think that what would be required there is an
17 idea of the sort of facilities that can be expected
18 within the Mackenzie Valley area, and a general
19 location of these systems. And I emphasize this
20 question of the general location of the systems
21 because I think that's all we can expect, and all
22 that should be before us at this preliminary stage.

23 if
24 Now, no doubt/there is more
25 definitive information at a later stage we would
26 obviously welcome this information, but as the appli-
27 cant says in that paragraph that I read of 14.4, the
28 details of final design for the oil line would have
29 to be known to determine if there were any problems
30 to be expected by juxtaposition of oil and gas
pipelines.

1 I think what he is suggesting
2 there is that to know the nitty-gritty of the problems,
3 you have to go to final design, and we're in a situat-
4 ion here, with respect to the gas pipeline that we're
5 not even at final design. And therefore, the statement
6 that we don't have great detail on the location of the
7 oil line or so on, begs the question, because we
8 really can't deal with it on the basis of specifics
9 at any stage, I think it would be unrealistic to
10 assume we could do that after phase 4.

1 The question then of
2 alternative routes is really evidence that I suggest
3 the applicant already has, and was at one stage
4 prepared to submit as part of Phase 1, and that is
5 14-E of his application. What we would hope would
6 happen, though, is that we would then be able to
7 evaluate these alternate routes, and this was the
8 point, I think, that Mr. Gibbs was getting at in his
9 cross-examination that was deferred to the corridor
10 phase.

11 The final part of any presen-
12 tation would probably be comments with respect to
13 the implementation or the organization of a corridor--
14 rather than ^{perhaps} ^{type of} implementation, the/institutional
15 arrangements and criteria that should be applied.

16 Now, Mr. Commissioner, we
17 recognize that some of these issues are already before
18 the Inquiry as part of the Phase 1 evidence presented
19 by Arctic Gas. Questions of criteria of routes
20 selection and the identification, if not evaluation
21 of alternate routes, and no doubt if the corridor
22 evidence was not to be admitted as a phase following
23 Phase 1, various participants would wish and
24 I think it would be quite proper to admit a great
25 deal of evidence that deals with the question of
26 criteria of route selection, going beyond the question
27 of cost, length and feasibility, which is the issue that
28 Mr. Dau directed us to.

29 The difficulty from our
30 point of view in trying to follow the course -- that

1 course of action, is that it prevents a proper consid-
2 eration of all of the criteria which we feel must be
3 presented because they are relevant and important to
4 the issue of route selection.

5 Arctic Gas has presented
6 evidence on route selection, as an engineering question
7 in the context of this evidence that they have presented,
8 but it's our submission that route selection can be
9 addressed as an engineering and geotechnical problem,
10 but that impact can only be understood as it relates
11 to the surrounding environment, and what other systems
12 are sharing that immediate environment.

13 Route selection is only
14 significant if we can understand the cumulative effect
15 of not only the gas pipeline but the highway and the
16 other systems, allied activities, as the applicant
17 states in its responses, that are part of that gas
18 pipeline. Whatever the ability of the applicant
19 to present route selection as an engineering or problem
20 in our submission an understanding of impact as it
21 relates and bears directly on route selection cannot
22 be so isolated, and if I may just use an example,
23 two alternative routes may have exactly the same
24 environmental impact but may be -- one may be environ-
25 mentally superior because it is already part of a
26 proposed highway route, while the other is an unspoiled
27 wilderness and suggested part of a future wildlife
28 sanctuary. Now if you're talking about route selection
29 and are asking for comments on the question of route
30 selection, and in discussing environmental impact of

1 that route, the evaluation would be basically on the
2 fact that one is in an untouched area and the other
3 is part of a corridor; and that's the environmental
4 difference between the two. The impact on the water
5 quality and so on may be exactly the same between the
6 two, but the environmental impact may be greatly different
7 solely because of that fact.

8 Mr. Commissioner, if routing
9 makes sense only in that context, we would ask if it
10 is fair to the people who are asked to comment on the
11 proposal and to assess the environmental impact and
12 in fact to this Inquiry, to go through the environmental
13 and socio-economic phases with only half the story
14 before the Inquiry. If the construction of the pipeline
15 demands the construction of a highway in a particular
16 location, is it not logical and fair that when determining
17 the environmental and socio-economic impact
18 we have these ancillary and related activities before
19 us?

20 The alternative is to go
21 through a detailed consideration of the impact and
22 then at the end, after we've gone through the environmental
23 and socio-economic phase and say, "Oh yes, but
24 we didn't mention to you at the time but there's also
25 going to be a highway here, and to the best of our
26 current knowledge there is also going to be an oil
27 pipeline and another facility as part of the proposal
28 that comes out of the gas pipeline proposal.

29 Now I would think that the
30 answer by people who are going to be commenting to this

1 Inquiry surely might be that had we known this, our
2 comments on the effect of the pipeline might have been
3 quite different. What we thought was tolerable may in
4 fact now be intolerable.

5 Mr. Commissioner, CARC 's
6 submission is that this Inquiry is in danger of doing
7 precisely what you warned us against in your preliminary
8 rulings, and at page 3 you stated:

9 "This Inquiry has been established to ensure
10 that the gas pipeline proposal is not considered
11 in isolation."

12 Now by the very nature of the evidence that we've had
13 to deal with, and ^{through} / no one's fault, we have had to
14 deal with very technical and detailed information and
15 we have intended, we have tended to isolate the gas
16 pipeline proposal. We have treated the pipeline pro-
17 posal as an isolated technical problem, and we're now
18 going to go on and discuss the environmental impact of
19 this pipeline proposal with another group of experts,
20 only slight less technical than the group we just
21 were dealing with at present, as presently constituted
22 the formal hearings we'll move from a dispute between
23 engineers on technical matters to a dispute between
24 biologists on technical matters.

25 Mr. Commissioner, our submission
26 is that at this time we should involve the Inquiry
27 in those issues that are most direct concern to people.
28 As far as the people who C_UARC represents, or who
29 regard CARC as their spokesman for reviews are concerned,
30 the question of routing and a consideration of

1 alternatives is a single most important issue before
2 this Inquiry. Most heave may be important and inev-
3 itable, but it may be tolerable in one area and intol-
4 erable in another.

5 The full scope and significance
6 of the Inquiry must be made clear at an early date.
7 In your preliminary rulings, you stated that this
8 Inquiry is not just about a gas pipeline, it relates
9 to the whole future of the north. We agree with that
10 interpretation of the role and purpose of this
11 Inquiry, and we wish to work with you in that regard.
12 But we find it difficult to provide this Inquiry
13 with our views of the environmental impact on land,
14 air and water and on the living environment if we do not
15 first have before us the full range of anticipated
16 activity.

17 Implicit in your rulings
18 to start this Inquiry with the engineering, construction
19 phase, it seems to us, was a recognition that you
20 could not consider the impact of a project unless you
21 know what the project is, and in our submission until
22 we have clearly laid out before us the ancillary and
23 anticipated other facilities, we cannot realistically
24 comment on the impact of the gas pipeline.

25 In summary, it is our
26 position and we would urge it on you that the corridor
27 evidence should come in before Phase 1 in order that
28 we may have before us the full project, by relating it
29 to the other related facilities around it or likely to
30 be around it before we are required to evaluate the

1 impact of a gas pipeline on the environment and on
2 the northern communities.

3 Environmental evaluation by
4 its very nature requires a more comprehensive knowledge
5 of the activity expected before any meaningful evalua-
6 tion can be offered. The gas pipeline will be inter-
7 acting with other systems and this inter-action is an
8 essential element of any realistic environmental
9 assessment.

1 Now, while I don't wish to
2 anticipate the position any others may wish to take,
3 I would like to make just a further comment.

4 It's our position that we would
5 reject any suggestion that our submission would result
6 in time wasting, since from our perspective, the same
7 time would be involved, no matter at what stage this
8 corridor evidence was to be presented, or that the
9 examination of corridors is somehow extraneous to the
10 main issues before this inquiry. Such a review, such
11 a view, rather, would, we submit, represent a complete
12 misreading of the corridor concept and its significance,
13 and would be, to our way of looking, an unacceptable
14 fetter on the scope of the Inquiry.

15 Perhaps an early examination
16 of corridor would bring to the public an awareness
17 of the true scope of the impacts we are facing and
18 are asked to evaluate, and a heightened appreciation
19 of the enormity of the issues that this Inquiry is
20 required to examine.

21 Now, for these reasons, we would
22 respectfully submit and request your directions that
23 the corridor evidence that we've outlined in brief,
24 be presented at the end of phase 1, so that we have
25 this information as part of the question of route
26 selection, routing and environmental impact before we
27 move into a consideration of environmental and socio-
28 economic impact.

29 That is our submission, thank
30 you.

1 THE COMMISSIONER: Mr. Anthony,
2 the meetings of counsel that Mr. Scott convenes are
3 designed to enable all of you to sort out matters
4 such as this/and as I understand it, you have been
5 successful, that is all of you have been successful
6 in sorting out a great many matters that relate to
7 the conduct of the Inquiry.

8 Mr. Scott has reported to me on
9 those from time to time, and when -- and I have made
10 it clear to him that if counsel cannot agree, they
11 are to feel free as you have done, to come forward
12 and lay the dispute before me. I want you to under-
13 stand that the only things that I have laid down are
14 the things said in the rulings that I issued last
15 year, and I want all counsel to understand that they
16 can, as you are doing, bring any matter before me in
17 this fashion at any time.

18 You suggested that I had con-
19 curred in what counsel had agreed upon at their
20 meetings. I don't think I have, because I have simply
21 left it to you people to carry on in an orderly way,
22 and you have done so. I think in remarkable style
23 but I don't want you to think that there is any
24 impediment to any of you bringing these matters for-
25 ward as you are doing today.

26 Can I just -- having said that,
27 comment on your proposition?

28 In this written statement that
29 you filed, you have indicated that C.A.R.C. may be
30 presenting evidence about the corridor concept, and

1 taking that together with what you've just said,
2 C.A.R.C. regards this corridor concept as one of the
3 first magnitude and is prepared to present evidence
4 in the widest sense.

5 Now, Arctic Gas, notwithstanding
6 what the pipeline guidelines have laid out, didn't
7 file any material with regard to what is said in
8 guideline - - the one you read, about the oil line.
9 I don't think there was anything filed that was in
10 any detail at all.

11 Would it make any sense -- you
12 don't have to respond now, but I would like you and
13 your colleagues, all of counsel to consider it, would
14 it make any sense for C.A.R.C. to lead its evidence
15 first in the corridor phase?

16 If C.A.R.C. has given rather
17 more consideration to the corridor concept than Arctic
18 Gas has, does it make make sense for C.A.R.C. to lead
19 its evidence first and for Arctic Gas then to follow
20 with the evidence which it is bound to submit under
21 the pipeline guidelines laid down by the federal govern-
22 ment, relating to the construction of an oil pipeline?

23 As I say, you don't have to
24 answer that now, but perhaps the other counsel would
25 consider it and tell me what you think about that
26 before the afternoon is out.

27 MR. ANTHONY: Perhaps it may be
28 just fair if I was to allow the others to make their
29 positions known --

30 THE COMMISSIONER: Yes, certainly.

1 MR. ANTHONY: -- and then I
2 would like to comment on these further.

3 MR. BELL: Mr. Commissioner, I
4 think that it's apparent that the corridor concept
5 and the inter-relationship between the various trans-
6 portation systems which would be contained in such a
7 corridor are important matters, for reasons which
8 have been well articulated by Mr. Anthony, and I
9 think they are matters which would be of interest
10 and great concern to the people of the north.

11 And it's my respectful submission
12 that there is a basic proposition which I think should
13 guide the Inquiry's deliberations on this question,
14 and that is as soon as is reasonably possible, we
15 should have presented to the Inquiry, an adequate
16 amount of information to enable the people of the
17 north to at least start to think about these issues.

18 I think there is a danger in
19 waiting for complete information. The danger was
20 partly outlined by Mr. Anthony, but I think it goes
21 further that if -- that the danger is that if we
22 will withhold from the public information which
23 although not complete is adequate at least to initiate
24 thought on this subject, information which the
25 public should have at an early date, I think that
26 precedent for this proposition has already been
27 set by this Inquiry, with respect to the gas pipeline.
28 The Inquiry is not awaiting the completion of formal
29 evidence, before it is asking people of the north
30 to start thinking about the impact of a gas pipeline.

1 And we have gone , and we will
2 continue to go ahead with community hearings on the
3 basis of information which, in my opinion, is still
4 fairly rudimentary although it may be embellished
5 with details, but what we have so far is the fact that
6 there is an application for a gas pipeline; that it
7 will carry gas; that it will be buried and chilled.
8 We have some idea of the general route that the appli-
9 cant wants to take and the size and the length of
10 the pipeline, and I feel that if the analagous inform-
11 ation is available with respect to the other modes of
12 transportation, the other transportation systems
13 which would be contained in a corridor, and I under-
14 stand that it is, then that information should be
15 put before the public at the earliest convenient
16 opportunity.

17 Even if this means that the
18 evidence on corridor will not be presented in a neat
19 package, I think the need to initiate public thought,
20 in my respectful opinion , outweighs the need to have
21 complete information presented as a unit.

22 It may mean that we will have
23 presentations on corridor on more than one occasion.
24 That is something to which I would take no objection,
25 and I submit that the inconvenience, if any, which
26 would be caused by that eventuality, is not unaccept-
27 able.

28 Mr. Genest, as I understand,
29 feels that he is not prepared to make a detailed
30 presentation until later in the inquiry, and I can't

1 ask him to do something he's not prepared for. I
2 would be willing to allow him a reasonable opportunity
3 to get prepared, but I think that if the Canadian
4 Arctic Resources Committee is ready to present this
5 basic type of information which would initiate thought
6 on the subject, then I can see great merit in having
7 it brought in at the end of phase 1, for the reasons
8 which I have just outlined.

1 MR. VEALE: Mr. Commissioner,
2 the counsel for Yukon Indians joins in the application
3 that Mr. Anthony has made, and I also endorse the
4 comments of Mr. Bell. Having a corridor phase
5 following Phase 1 would meet our objectives.

6 However, considering that
7 some opposition has been voiced to this, I would point
8 out that an extremely important consideration for the
9 Council for Yukon Indians is route selection. That
10 is quite apparent in considering that there are four
11 alternate routes, possibly five if you look at the
12 off-shore route that passes through the Yukon Terri-
13 tory, and we're dealing with transporting Alaskan gas
14 to United States, and from that point of view the
15 primary interest for the Council for Yukon Indians
16 is where that pipeline is going to go and what
17 communities will be affected.

18 This is particularly with
19 respect to the fact that the Government of Canada has
20 indicated that there were two routes that it was
21 prepared to accept applications on, and one of those
22 routes passes by Old Crow. Now the other route, the
23 Fairbanks route or the Alaska Highway route, and Fort
24 Yukon route, are in our submission extremely important
25 to be put in front of the public of Canada and the
26 government, so that nobody is locked into consideration
27 of the two routes that the applicant has now suggested.

28 Now routing, the evidence
29 relating to routing would be very narrow if it were
30 not to consider the various corridor aspects which

1 different routes may involve. In our submission,
2 the applicant has already prepared Section 14-E and
3 was prepared to bring that on at an earlier date, and
4 --

5 THE COMMISSIONER: That's
6 right.
on that.

MR. GENEST : We won't dwell

7 MR. VEALE: In our submission

8 --
9 THE COMMISSIONER: I had
forgotten about that.

10 MR. VEALE: Well, we haven't.
11 In our submission there is really no prejudice to the
12 applicant to have that evidence brought on in Phase 1
13 even and to also add to that evidence consideration of
14 comparative advantages as between corridors. Now that
15 would not involve the total corridor phase, and I am
16 suggesting that there is an alternative.

17 Now the timing, as I have
18 indicated, is extremely important, because it would
19 be a rather narrow perspective to listen to the
20 evidence of the four phases, without having the pers-
21 pective of the various routings that could take place
22 through the Yukon Territory.

23 Finally, Mr. Commissioner,
24 it would be our intention in a route selection panel
25 or a routing panel to bring one or two witnesses to
26 indicate the position of the Council for Yukon Indians.

27 MR. BAYLY: Mr. Commissioner,
28 as Mr. Veale has outlined, the 14-E evidence was
29 originally to be called in this panel, and as you have
30 observed, counsel had agreed that the corridor phase

1 was important enough -- the corridor idea was important
2 enough that it should have a phase of its own.

3 One of the confusing things
4 in my submission, is that corridor and routing are
5 often either thought of as the same thing or mixed
6 up. I am not sure I completely understand what people
7 mean when they say "corridor" or "route selection",
8 but may I suggest to you, sir, that we have already
9 had Arctic Gas deal in a geotechnical way with the
10 selection of the prime route, and its comparison with
11 the interior alternate route, and that this was dealt
12 with, I would submit, in a very narrow way and that it
13 dealt with only the reasons why these particular
14 routes were thought to be superior to any others.

15 I would submit that while the
16 corridor concept -- and I consider that to be the
17 concept of thinking in terms of having more than one
18 facility going down the same route, more than one
19 pipeline, perhaps the possibility of roads and railroads
20 and hydro transmission lines -- that to me is corridor,
21 running everything down together; whereas routing,
22 while it may determine the most appropriate place to
23 put a facility like a pipeline, does not necessarily
24 preclude putting a pipeline in an area where there are
25 no other facilities. We have discussed routing in the
26 absence of the consideration of any other facility, but
27 only in the prime route. I would submit that our first
28 position would be to support Mr. Anthony's motion,
29 that the corridor concept should be dealt with in a
30 separate phase still, and that it should be dealt with

1 soon, and right after Phase 1, if possible.

2 No agreement was made by
3 counsel that the corridor concept should be put off
4 for a long time, only that it shouldn't be dealt
5 with in this geotechnical area. It appears from
6 discussions with counsel -- and this is where the
7 difficulty has arisen -- that some people want it put
8 on after Phase 1 and some others would like it deferred
9 for a longer time, in fact an indeterminate time, we
10 don't know whether that would mean it would come in
11 between 2 and 3, or much later than that.

12 In other words, I submit that
13 it should come on after Phase 1, but if it doesn't I
14 would submit that it is still possible because we can
15 discussion route selection in Phase 1, for those other
16 participants who have evidence on route selection
17 without necessarily going into competing or parallel
18 facilities, to discuss route selection on their own
19 terms without necessarily accepting Arctic Gas's
20 narrow interpretation in the first phase of what
21 should be discussed on route selection.

22 In other words, if Mr.
23 Anthony wants to bring witnesses in Phase 1, to discuss
24 the fact that there may be other routes which are
25 superior to the prime route or the interior alternate
26 route, I would submit that he should be able to do
27 so, given your ruling, sir, and given the fact that
28 there will not be any real disadvantage to any of the
29 other participants.

30 Following on that and perhaps

1 to raise a parallel situation, if we were all governed
2 in the evidence we were to give by what the applicant
3 raised, we might find ourselves in this situation in
4 Phase 4, the applicant might say, "We don't want to
5 call any social and environmental impact evidence."
6 The other participants, I submit, should not be
7 precluded from calling any evidence either.

8 THE COMMISSIONER: Well, no,
9 no one has ever suggested that.

10 MR. BAYLY: I'm suggesting
11 though, sir, that if we were to limit the ability
12 of any other participant to call broader evidence on
13 route selection in PHase 1, than has been called by
14 the applicant, we would be doing functionally the
15 same thing. I would support Mr. Anthony in his feeling
16 that in order to discuss the impact in all ways of
17 this facility and any facilities that may follow,
18 it is important to inform especially the people of the
19 north, and secondarily the people of the rest of
20 Canada, that there are other facilities that may
21 possibly want to use the same or parallel route rather
22 than presenting, as we have done, I think -- and this
23 did come out in the community hearing in Aklavik --
24 a single route and an interior alternative, as almost
25 a fait accompli. To give people who are going to
26 discuss this in their own terms some idea that there
27 are other possible alternatives, even although they
28 may be more costly and less practical, might make the
29 community hearings a lot more responsive to the
30 possibilities, rather than looking at one single

1 possibility which has been presented without
2 alternatives.
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1 MR. HOLLINGSWORTH: Mr.

2 Commissioner, when I was quoted -- not quoted, but
3 Mr. Anthony advanced the proposition that this motion
4 was being brought by several people including Foot-
5 hills, I don't think that that's entirely accurate.

6 I had indicated to Mr. Anthony
7 and others that we were prepared to support a motion
8 that the corridor concept be brought on quickly, but
9 it's not a matter of great import to Foothills when
10 that matter is heard.

11 The fact of the matter though,
12 seems to me that the appropriate time for such a phase
13 to be heard would be within the ambit of the engineer-
14 ing evidence which we have heard thus far.

15 The phases which are to be dis-
16 cussed after this, deal more with the environment
17 and the socio-economic factors, which in my submission,
18 could have application to any number of different
19 routes. Not in detail perhaps, but in broad general
20 terms.

21 The fact of the matter is that
22 once this subject matter was removed from phase 1, it
23 was kicked down to the end of phase 4 almost by
24 default, because at that time we'd decided that there
25 were at least four phases to be discussed. These in
26 fact, were listed in your preliminary rulings, and
27 it seemed that as I say by default, the alternate
28 corridors and the corridor system generally, got
29 thrown down to there because it was assumed that every
30 other phase would be heard in the order in which

1 it had been listed in your rulings.

2 I suggest that that is how it
3 got to be relegated to that position.

4 THE COMMISSIONER: I wasn't aware
5 that it was relegated. In quite that stern a fashion.

6 MR. HOLLINGSWORTH: No, I
7 wouldn't say it was relegated by yourself, sir. It
8 transpired --

9 THE COMMISSIONER: Well, I didn't
10 know that you people had either.

11 MR. HOLLINGSWORTH: It transpired
12 at meetings of counsel, it was just naturally assumed
13 almost from the tenure of the conversations, that
14 because the certain phases had already been set,
15 well then the corridors would come in somewhere
16 along the end of the line there.

17 THE COMMISSIONER: It may be a
18 mistake to go to those meetings.

19 I am sorry I interrupted you,
20 Mr. Hollingsworth.

21 MR. HOLLINGSWORTH: Not at all ,
22 Mr. Commissioner. After all, it gave me a chance to
23 get a drink of water.

24 The arguments for having the
25 me to
corridor proposal now seem to/be based on the fact
26 that there's no disadvantage to it. Mr. Genest raises,
27 and probably will raise the argument with you that he
28 needs time to prepare such a concept, and I can only
29 agree and sympathize with him that he will need time,
30 but here we are getting towards the last three days

1 of formal hearings in April. In May there will be
2 nine days of formal hearings. In June it's anticipated
3 that the first week will be taken up by the Environ-
4 mental Protection Board's evidence, and I believe that
5 there is no other formal hearing set for June.

6 July and August, particularly
7 July look very much as if they will be taken up in
8 their entirety by community hearings. When you see
9 that we already have the evidence of the construction
10 panel, the operations and maintenance panel and the
11 gentleman who has been to the Soviet Union to consider,
12 along with Mr. Horte, and it's beginning to look by
13 this time that Mr. Horte might be months on the stand,
14 judging from the number of questions that have been
15 thrown into his bag, then on top of that the other
16 -- the intervenors have the opportunity to advance
17 evidence in chief. Then I don't think that Mr. Genest
18 can really -- well I shouldn't include that last
19 aspect, because obviously if this were included in
20 phase 1, then the corridor phase -- panel rather,
21 would come before evidence was adduced by the inter-
22 venors.

23 In the event that the corridor's
24 concept was considered as a separate phase, well then
25 it would be following that, and it's my suggestion
26 that we'll be a long time in the future, and that
27 the time element which Mr. Genest has raised is really
28 not a consideration.

29 I understand that another consider-
30 ation is that if we wait on the corridor concept, then

1 possibly an oil pipeline will have been proposed in
2 and
3 the interim, the question of routing down the Mackenzie
4 corridor will then be a little more certain, and we
5 can get down to the nitty-gritty, as to what route
6 this line ought to be taking, as opposed to the oil
7 line, or whether certain changes ought to be made, and
8 what distances between them ought to be.

9 I personally know of no early
10 proposal being forthcoming on an oil pipeline down
11 the Mackenzie, and I would certainly be interested
12 to hear the responses of my friends who are apparently
13 opposing this motion.

14 THE COMMISSIONER: Well I would
15 like to ask you a question, Mr. Hollingsworth. Foot-
16 hills has filed an application for a right-of-way.
17 It is bound, like Arctic Gas, under the pipeline guide-
18 lines, to submit with its application, an assessment
19 of the suitability of its route, for the gas pipeline,
20 for nearby routing of the oil pipeline in terms of
21 the environmental, social, and terrain engineering
22 consequences of the other pipeline, and the combined
23 effect of the two pipelines.

24 It is also bound to provide an
25 assessment of the environmental social impact of both
26 pipelines on nearby settlements, or nearby existing
27 or proposed transportation systems and it's bound also
28 to supply a comparison of its proposed route with
29 alternative pipeline routes, in terms of environmental
30 and social factors.

Has Foothills supplied all of

1 those things with its application for right-of-way?

2 MR. HOLLINGSWORTH: I couldn't
3 answer that question, sir.

4 At the moment the application is
5 just not completely filed, as everyone here is well
6 aware. Certainly my understanding is that all this
7 information is going to be filed, but you're asking
8 if it is filed now, and my understanding would be no,
9 but I don't really know in making that statement
10 whether I'm correct or not, because it may have been
11 filed in the last couple of days.

12 My suggestion to you is that
13 the oil pipeline is still so far away that the argument
14 that the corridor concept should be put off until such
15 time as an oil pipeline is proposed, is an empty
16 gesture.

17 THE COMMISSIONER: Is what?

18 MR. HOLLINGSWORTH: Is an empty
19 gesture, because there isn't going to be a proposal
20 anywhere within the next year.

21 THE COMMISSIONER: Well, how do
22 you know all of this?

23 MR. HOLLINGSWORTH: I prefaced
24 my remark by saying it was a suggestion, sir. It's
25 been advanced as an argument for putting off the
26 corridor concept, that an oil pipeline route will
27 be proposed within that time, and I'm anticipating
28 this as a possible argument, and suggesting that this
29 just isn't so.

30 I really have no further

1 submissions to make, sir. It's a matter of supporting
2 this application because I think it's a most sensible
3 and propitious time to advance the concept.

4 THE COMMISSIONER: Yes.

5 You said, Mr. Veale, that the
6 Council of Yukon Indians was in a position to call
7 witnesses in connection with the corridor concept.
8 Mr. Anthony has indicated that C.A.R.C. is in a posi-
9 tion to call evidence on the corridor concept. That's
10 what you were talking about, the corridor concept, and
11 more particularly, I suppose, the route of the pipe-
12 line? Now, do I understand you?

13 The route of the gas pipeline?

14 MR. VEALE: Well, our concern
15 is primarily the route of the gas line, and we would,
16 at all costs we would prefer to have routes discussed
17 at an early stage if that were all that could be dis-
18 cussed.

19 However, we are also prepared to
20 go into the corridor concept whole hog as well.

21 THE COMMISSIONER: You mentioned
22 that there had been mooted, a route, a so-called
23 Fairbanks route.

24 Now, what I am asking you is
25 whether you intended, if you were to call evidence
26 to deal with the Fairbanks route, or whether you were
27 concerned solely with whether should a gas pipeline
28 be built, the coastal route or the interior route
29 would be preferred?

30 MR. VEALE: No, Mr. Commissioner,

1 we would bring evidence on the Fairbanks route and
2 the Fort Yukon route. That is our intention.
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1 MR. GENEST: I was just
2 wondering if that would be evidence in favor of that
3 route over the prime route we have selected? It
4 would be helpful to me to know.

5 THE COMMISSIONER: Do you
6 want to respond to that, Mr. Veale?

7 MR. VEALE: Your question
8 again, Mr Genest?

9 MR. GENEST: I was wondering
10 what the nature of the evidence -- would it be
11 evidence that would tend to support the choice of the
12 Fairbanks corridor over the prime route that Arctic
13 Gas has selected?

14 MR. VEALE: I would prefer not
15 to answer that question at this time, but present it
16 with our evidence.

17 THE COMMISSIONER: Well, where
18 do we -- Mr. Genest?

19 MR. GENEST: Well, I have some
20 remarks, sir, and perhaps it would be helpful for you
21 to properly understand my position. If I went back
22 to the day on which this concept of the separate corri-
23 dor phase was first mooted as Mr. Scott I think has
24 previously indicated to you, it was a concept that
25 I opposed, and my opposition was based on the reading
26 of your rulings, that phasing portion of your rulings,
27 at page 3 where it says:

28 "The formal hearings will be divided into
29 four phases,"

30 and the title of each phase says:

1 "Engineering and construction of a proposed
2 pipeline,"

3 that's the first one; then the second phase says:

4 "The impact of a pipeline and Mackenzie
5 corridor development on the physical
6 environment."

7 The third phase says:

8 "The impact of a pipeline and Mackenzie
9 corridor development on the living environment,"
10 and the fourth phase says:

11 "The impact of a pipeline and Mackenzie
12 corridor development on the human environment,"
13 and it was my position originally that there should
14 not be a separate corridor phase because your rulings
15 envisage that the corridor impact would be dealt with
16 phase by phase, and that therefore we should be
17 prepared to present evidence at each phase relating to
18 the corridor, such evidence as we are able to bring
19 forward. We have problems with the extent of that
20 evidence. I am quite aware of the obligation that is
21 case upon us by the ruling, and I believe that we have
22 to go beyond what is in the formal application materials.

23 . THE COMMISSIONER: Well, not
24 so much cast upon you by the ruling, but by the pipeline
25 guidelines.

26 MR. GENEST: By the pipeline
27 guidelines themselves, quite right, sir.

28 That was not accepted, I stood
29 alone in that view. All of the other counsel, I exclude
30 from this possibly Mr. Gibbs, who in my recollection,
sort of sat on his country fence on the subject,

1 but my impression was that I was alone in that view;
2 after discussing the matter, I agreed that if that was
3 the feeling of all the parties there should be a
4 separate phase.

5 Now, Mr. Bayly says that there
6 was no agreement as to the timing of that phase. I
7 don't dispute that except that I must say that my
8 impression was that your phases would take precedence,
9 and that the corridor phase would come at the end of
10 the first four phases. So I prepared my evidence
11 accordingly.

12 I have -- and it's a job to
13 prepare this evidence. Arctic Gas, sir, is now in a
14 phase where the Federal Power Commission hearings are
15 starting on May 5th/^{where} the National Energy Board
16 is going to start its hearings, we understand, although
17 we have no official notification, sometime this summer.
18 The scheduling of witnesses and their time in preparing
19 matters is extremely limited. There's a strong demand;
20 I realize that should not in the last analysis govern
21 what your decision as to what is fair and proper in
22 this hearing, but I do urge upon you that it is a
23 consideration that you ought to take into account.
24 Actually the possibilities and the strains imposed upon
25 us in coming forward and meeting this kind of case so
26 I say in the first place I have, in view of what has
27 happened, I have a very practical problem in preparing
28 evidence, adequate evidence, evidence that will be
29 well thought out and helpful to the Inquiry, rather than
30 throwing something together on the back of an envelope,

1 as it's been suggested we do sometimes. I have a
2 problem in preparing that because of the demands on
3 my witnesses.

4 Secondly, sir, I look upon at
5 least the Arctic Gas' interpretation of the pipeline
6 guidelines insofar as they apply to a corridor
7 concept, is that they are related really to an oil
8 pipeline. The specific mandate of the guideline
9 refers to a comparison to an obligation to provide
10 an assessment of the suitability of our route for
11 nearby routing of the other pipeline, it doesn't
12 really talk about a highway or railroads or other
13 methods of transportation, as^{is} urged by Mr. Anthony.

14 It is true that we were
15 prepared during Phase 1 to bring forward evidence
16 dealing with alternative corridors. It would seem to
17 me, sir, that to sort of start and go back again,
18 especially in view of the cross-delta alternative
19 which has raised itself since you made your rulings,
20 that it would really be premature to have evidence
21 which tries to weigh the alternative merits of various
22 pipeline routes before that evidence is in, before the
23 applicants and you and the public has had an opportunity
24 to see what are the merits and demerits of the cross-
25 deltaalternative. All we have filed to date are
26 alignment sheets and background reports. We have to
27 file some more detailed material which is in the course
28 of preparation before this Inquiry.

29 As to the comments of my
30 friends that the matter of route selection is one of

1 vital importance, I appreciate that argument, but
2 I submit to you, sir, that the decision as to the
3 final judgment on the appropriateness of the route
4 selected depends on every one of these phases. It does
5 not depend only on the evidence that you've heard in
6 Phase 1, because there must be taken into account
7 in judging the appropriateness of the route the
8 environmental impact and the social impact. These may
9 affect a judgment as to whether a route is properly
10 selected or not. So it seems to me that notwithstanding
11 what at first I thought was the illogic of a separate
12 corridor phase, ^{having gone} and/having accepted that, that the
13 corridor phase should be analyzed and should be looked
14 at after you have heard the main evidence relating to
15 the impact of this pipeline as set out in your rulings.

16 Your rulings themselves
17 recognize that it's impossible or an attempt to bring
18 some order into the very many issues raised by this
19 application. It's impossible to say they are strict
20 compartments. There is overlap; but this is all one
21 hearing, and the report isn't going to be made until
22 you have heard all the evidence, and evidence that
23 comes late is going to affect your report, just
24 as much as evidence that came early. So in my submission
25 there has not been demonstrated any urgent need to
26 bring forward as a set piece a consideration of the
27 entire corridor concept. And I wish to say, sir,
28 again that I do not accept the very broad outline of
29 what should be considered in a corridor concept, as
30 set out in Mr. Anthony's submission. It seems to me

1 that to properly investigate the matters that he
2 has listed in his submission, the total transportation
3 complexes of the north, the transportation needs of the
4 north, is really a separate Inquiry. We could spend a
5 year looking at this problem .

6 The guidelines themselves
7 talk about another oil pipeline. I know that you can't
8 ignore these, you can't consider these in a vacuum
9 and you may have to give some consideration to these.
10 But it seems to me that what Mr. Anthony is suggesting
11 is that we really have a set piece Inquiry into these
12 subjects, and it is a broadening of the scope of the
13 Inquiry which in my submission you should not meet.

1 So in summary, sir, I have first
2 of all very practical problems in dealing at the
3 phase suggested with the corridor concept, and secondly,
4 I submit that it has not been demonstrated that there
5 is a need to put it up at the front end.

6 Those are my submissions.

7 I might add, perhaps, lest there
8 be no misapprehension, I cannot argue; my information
9 is that as far as the delay in the consideration of
10 the corridor concept, insofar as it relates to an oil
11 pipeline, is going to gain us very much in knowledge.
12 From the information I've been able to get is that
13 there are really no -- there is nothing in the works
14 that will sort of produce more knowledge in November
15 than we have now, about a possible oil pipeline, so
16 I can't urge that upon you as a ground.

17 MR. SCOTT: Mr. Commissioner,
18 I would like to join Mr. Genest, strange as it may
19 seem, in opposing this application.

20 Let me say first of all that at
21 the counsel meetings, it has been our attempt on all
22 these matters of procedure, to develop a consensus,
23 and we have done so a remarkable number of times.

24 From time to time, it has been
25 my duty to declare what the consensus is, and I have
26 no doubt that that has once or twice led to an
27 evaluation that has not always been accepted by all
28 my colleagues, but I emphasize, and I don't think
29 any of them disagree, that the rule has been under-
30 stood that any dissatisfaction with a unanimous

1 consensus but one, or the declaration of a consensus
2 can and should, in an appropriate case always be
3 resolved by you, and that of course is why Mr. Anthony
4 and his colleagues are here.

5 The trouble, if I can put it that
6 way, arises because of our early and perhaps naive
7 expectation that all matters that were to come before
8 the Inquiry could be divided into the four phases
9 which I suggested to you at the preliminary stage,
10 and which are set out in some detail in your preliminary
11 rulings number 2.

12 It quickly became apparent that
13 that was a naive assumption, and indeed the preliminary
14 rulings recognizes that the categories should not be
15 iron-clad, but it early became apparent that that was
16 naive because it was recognized that notwithstanding
17 our best efforts for example, that there was no
18 way that the evidence dealing with the delta producers
19 could be squeezed into one of the four compartments,
20 and no way that the extensive evidence that may
21 be called with respect to regulation could be
22 squeezed into those compartments.

23 And when my colleagues and I
24 came to a problem of that type, we stipulated, as we
25 have done with those examples, that there should be
26 another phase that would deal, with particularity with
27 those items.

28 It was, as Mr. Hollingsworth I
29 think has correctly said, always assumed -- always
30 been assumed by all of us, I think, that those additional

1 phases as they might be required, would follow the
2 four phases.

3 Now, I think Mr. Genest is right
4 when he asserts that like Horatio at the bridge, he
5 stood alone and asserted that corridor concept should
6 be dealt with, within the context of the four phases.
7 I don't think I do any injustice if I say that it was
8 Mr. Anthony who led the attack on that position, and
9 asserted vigorously, and successfully, that there
10 should -- just as there was with the delta and
11 regulation, be an additional phase that would deal
12 with corridor concept.

13 And Mr. Hollingsworth is right
14 though when he says that/it was discussed from time to time,
15 it was, I think assumed, at least in the late autumn,
16 that that phase would follow the four phases that
17 are enumerated in your rulings.

18 As you approach the problem,
19 which really is this -- where will the corridor phase
20 be fitted -- I think it's important to understand
21 precisely what Mr. Anthony wants to deal with in that
22 corridor concept.

23 First of all, he wants to deal
24 with the applicant's evidence and any of his own, if
25 there be any, that relates to the suitability of the
26 applicant's route for the development of a communicat-
27 ion corridor. The burden is cast on Mr. Genest,
28 which he accepts, to show that insofar as he can, that
29 his route, and that means the route that he has pro-
30 posed, is suitable for the development of a corridor.

1 I take issue with him only in
2 saying that it doesn't seem to me that the guidelines
3 restrict the question to an oil pipeline, they deal
4 -- they contemplate also, all proposed communications
5 media. A highway clearly falls within that category;
6 I don't know to what extent the proposal is formal,
7 I suppose conceivably a railway falls within that
8 category, if it can be regarded as a proposed trans-
9 portation media..

10 Now that's item one that comes
11 within the things that Mr. Anthony wants to discuss
12 in this special phase.

13 The second thing that he wants
14 to discuss, is, the first thing is clearly something
15 about which the Inquiry must deal. The second thing
16 he wants to discuss is this: He wants the applicant,
17 I presume, to provide details and an analysis of all
18 the alternate routes that the applicant considered
19 and rejected in coming to the decision that he had
20 a prime route.

21 You will recall that Dr. Mollard
22 and Dr. Dau -- and Mr. Dau indicated that there were
23 four or five corridors in that sense that were con-
24 sidered in a very preliminary way, as I gather, and
25 rejected at an early stage. so Mr. Anthony wants
26 evidence led with respect to those four or five alter-
27 natives that the applicant has rejected.

28 The third thing that he wants
29 considered, and if he's in any doubt Mr. Veale wants
30 it considered, is he wants the participants' routes

1 considered. That may be, for all we know, a number
2 of routes that the applicant has never considered at
3 all. The participants, at least Mr. Veale, and I
4 gather Mr. Anthony, contemplate the possibility of
5 calling evidence that will show the Inquiry, for
6 example, that the pipeline should go in an entirely
7 different location than any proposed by the applicant.

8 Now, let me assume for the moment
9 that you have authority under your -- under your
10 Order-in-Council to say to the applicant, the condition
11 I am making is that you shouldn't go here, but rather
12 you should go on the other side of the mountains;
13 I assume that you have that power. I simply emphasize
14 that the three things that Mr. Anthony asks you to
15 consider are make the corridor concept a broad and
16 all-inclusive one.

17 Now, as to the timing. There is
18 no doubt that you have the power, sir, to direct the
19 order in which the evidence is called. It's my
20 respectful submission, however, that you should give
21 some priority, if it can be done without an injustice
22 to the order of the case, to the applicant's views.
23 After all, to a certain extent, not entirely, of course,
24 but to a certain extent, a burden is cast on the
25 applicant. This is not his application, but it is a
26 hearing that is triggered by and that responds to his
27 application, and it seems to me that we are not con-
28 fronted with a situation where the issue is, will the
29 evidence be heard or will it be not, we're dealing
30 simply with timing and some priority should be given

1 to the applicant in permitting him to call the case
2 in an order that is satisfactory to him, if it does
3 no grave injustice to any of the participants.

4 The second consideration I make,
5 I advance, and it's the same perhaps, as Mr. Genest's,
6 and that is that the appropriateness of the prime
7 route advanced by the applicant, and therefore its
8 relative merit as against any other proposed routes,
9 can only be determined once you have some handle on
10 its appropriateness in terms of the issues that are
11 going to be dealt with in phases 2, 3 and 4, and
12 therefore it seems to me, respectfully, that logic
13 requires that the applicant's proposal which is
14 before you, should be fully examined to determine its
15 appropriateness, before the alternatives, if that's
16 what they be, be examined.

17 Now, the last submission I make
18 is that -- is this. It seems to me that the people
19 of this territory are entitled to know at the earliest
20 possible time, the ramifications of the proposal
21 that is made by the applicant. What is the applicant's
22 proposal going to mean if accepted by the government,
23 in terms of animals and fish and the land and the air
24 and the water itself?

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1 The result of inserting a
2 phase after Phase 1, that may at the present rate take
3 two to three months to deal with, will be to postpone
4 ~~the~~ consideration of those very fundamental issues and
5 postpone them in favor of what? To postpone them in
6 favor of the discussion of a highway, the route of
7 which apparently is already fixed, to postpone them
8 in favor of -- and this is only possible -- the con-
9 sideration of a railway, which is the favored project
10 of only a few in the community, and to postpone them
11 in favor of the consideration of an oil pipeline of
12 which at the moment very little is known.

13 that
14 It seems to me to embark on that
15 course will mean that the people of this Territory at
16 an early stage will not have before them the evidence
17 on the issue, what does this proposal mean for us in
18 terms of our communities, in terms of our life, in
19 terms of the animals and fish on which we live? It seems
20 to me that it would be wrong to postpone at this
21 stage that kind of consideration. There will be plenty
22 of time later to consider alternatives and corridor
23 at a stage when the people of the community, listening
24 by radio and in presence to this hearing will know
25 what the applicant's prime route means for them
26 precisely. So on those grounds, sir, I respectfully
27 submit that it is not appropriate to at this stage
28 determine that the corridor concept involving those
29 three matters should be heard following Phase 1, that
30 that will do some injustice to the order of the
proceedings, and that those matters will not remain

1 uncanvassed, the canvas of them and some of them are
2 pretty exotic and esoteric, will simply be deferred to
3 a stage when the impact of the prime route submitted
4 is more precisely known. I would therefore ask that
5 the application be dismissed.

6 MR. ANTHONY: Mr. Commissioner,
7 unlike yourself and in this regard I think you're
8 probably lucky. These arguments have gone around a
9 number of times and I won't repeat them again, because
10 I find myself in finding the greatest support for
11 the argument I propose, in what Mr. Genest has said
12 and by what Mr. Scott has said, ^{the last, the} except for conclusions
13 he drew. Mr. Genest, first of all I think, tried to
14 narrow the guidelines beyond what I think the guide-
15 lines and certainly your rulings suggest this Inquiry
16 is about. I think Mr. Scott mentioned that in a review,
17 the guidelines indicate that they certainly
18 speak beyond merely an oil pipeline and certainly your
19 preliminary rulings make it very clear that they go
20 beyond merely consideration of an oil pipeline.

21 But even taking the words that
22 Mr. Genest has urged on you, that phases 2, 3 and
23 4 are designed to get at the impact of a pipeline and
24 the Mackenzie corridor, on the environment and on the
25 development, the question is how can this be done if
26 we don't know what the corridor is or where it is, or
27 what's going to be in it? The argument is that you
28 can only assess impact if you know what's going to
29 take place, and the gas pipeline by its very existence
30 is demanding certain other activities go along with it.

1 It's demanding certainly a communications facility,
2 we heard Mr. McMullen give that evidence. It's
3 demanding a highway, and we got a glimpse of that and
4 there will be a lot more of that. Now surely if we
5 want to understand what the impact of the pipeline is
6 going to be, we have to know what's going to happen.

7 My submission is that Mr. Scott's
8 desire for us to evaluate the impact on the environment
9 and on the people can only be done if we know what the
10 activities are. That's really, I would suggest,
11 is really the core of this dispute. What is it that
12 we're asked to evaluate in Phases 2, 3 and 4? I take
13 from your preliminary rulings, and I take from the
14 scope and the hope of this Inquiry that we can't
15 isolate the pipeline, and the reason why the 14-E
16 evidence referred to corridor was, I thought it was
17 a conversion but obviously it wasn't by way of
18 conversion, but that's more in the way of compromise,
19 was the understanding that you can't compare alternativ-
20 es unless you know what the alternatives are, which
21 have been touched on, and the environment or the background
22 in which these alternatives are going to exist.

23 Surely you can't consider the possibility of the
24 interior route as compared to the coastal route unless
25 you know that the interior route is also going to be
26 the route proposed for the highway, for example.

27 These are surely the only way you can ^{really} make any sort
28 of an assessment, and while you can in the phasing
29 that we now have discuss questions of how long the
30 route is going to be, you can't consider impact in

1 that way. We have every indication that the F.P.C. in
2 the United States and certainly the Alaska Government
3 and its submissions and so on, are demanding
4 that this pipeline examine other routes other than
5 merely the two alternatives that are being proposed.
6 I think it would be unfortunate on our part --

7 THE COMMISSIONER: Sorry, I
8 missed something there. What is it that Alaska is
9 demanding?

10 MR. ANTHONY: The Alaska
11 Government, and I guess relate this on the basis of
12 both newspaper stories and correspondence, but is
13 demanding that the F.P.C. and their regulatory hearings
14 and through correspondence, perhaps I'm suggesting that
15 we too consider routes other than the two routes that
16 are presently being proposed for their extension of
17 the pipeline.

18 The other country involved
19 in this pipeline is making it very clear that they
20 are going to examine from the very earliest stage
21 all other possible routes, and I'm suggesting that
22 it would be folly for us to not do the same thing at
23 the very earliest stage.

1 I think that I have perhaps
2 dealt with what my concern is and why I feel that it
3 is not merely a question of convenience and timing,
4 but it really goes to what I consider to be the funda-
5 mental issue and integrity, and from our point of view,
6 a necessity before we can do the job which we would
7 like to do in assisting this Inquiry, and that is to
8 give our considered opinion on what the impact of
9 this pipeline is going to be.

10 The only other thing is I will
11 go back to your first consideration about us leading
12 evidence. I think probably any formal decision on
13 that would have to await my clients' consideration,
14 which would unfortunately be bound quite closely to
15 problems of resources, if not of timing. And ^{that} I would
16 suggest that the evidence on corridor, its signi-
17 ficance and importance is made clear, and I would
18 suggest that that is a clear duty on the applicant,
19 and while we are certainly prepared to go the further
20 step that perhaps the applicant is not prepared to go,
21 and we'll use our resources and time to the limit to
22 ensure that these issues are discussed, I think that
23 the first step is the applicant's obligation, and I
24 would hope that he would take it on gladly.

25 We will certainly encourage him
26 to take the second step.

27 THE COMMISSIONER: Well the
28 applicant, Arctic Gas, has been unable so far to file
29 any evidence with the Inquiry, though it has had a
30 year since the Inquiry was established, that is useful

1 in connection with the likely development of an oil
2 pipeline following the development of a gas pipeline.

3 And what I put to you was if
4 we were to go into this corridor concept, whether we
5 were to do so in the course of phase 1, or in the
6 fall, I assume those are mutually exclusive, but when-
7 ever we do it, it appears that Arctic Gas is -- that
8 Arctic Gas is not in a position to offer a fully
9 developed analysis of the problems that the corridor
10 concept laid down by the federal government in the
11 pipeline guidelines entails.

12 Now, I'm saying to you, as counsel
13 for Canadian Arctic Resources Committee, is your
14 client prepared, whenever we proceed with the evidence
15 relating to the corridor concept, to begin the corridor
16 concept by bringing forward evidence?

17 Now you mentioned something about
18 adequate resources and so forth. Putting that to one
19 side, assuming that you were to have those resources,
20 are you in a position to do that? That is a consider-
21 ation that weighs with me. Mr. Genest isn't in a
22 position to begin the corridor concept, he isn't in
23 a position to call evidence. Certainly he isn't now,
24 he says, on behalf of Arctic Gas, and I accept that.

25 The question then, in my mind, is
26 are you, on behalf of Canadian Arctic Resources
27 Committee, prepared to bring forward the evidence?
28 Mr. Veale, on behalf of the Council of Yukon Indians
29 says that he is prepared to call evidence, and the
30 implications of the whole question of the corridor and

1 route selection for the people of Old Crow is obvious.

2 You see, one of the points that
3 you and those who take your side on this thing have
4 made, is that the community hearings will be -- that
5 the people who live in those communities have heard,
6 through the broadcasting that the C.B.C. has established
7 here, all about the gas pipeline, but the ramifications
8 of the development of the gas pipeline have not yet
9 been considered here in the formal hearings, so the
10 Inquiry, proceeding from Yellowknife to the communities
11 is doing so -- I take it this was the point -- before
12 the implications of the development of a gas pipeline
13 have been fleshed out.

14 And you're suggesting that that
15 should be done so that as many of the communities as
16 is possible, have an idea of the ramifications of
17 the development of a gas pipeline before the Inquiry
18 visits those communities.

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1 It's getting late. I had got
2 the feeling I had gotten hold of this subject and I
3 now have the feeling it may be slipping away on me.
4 But that's what concerns me. I think you've made a
5 point of some force in that regard. But there
6 really isn't any usefulness in going ahead if Arctic
7 Gas continues to take the position it has so far,
8 and that means that the Inquiry has to turn to
9 Canadian Arctic Resources Committee and those who
10 side with that Committee in this matter, and if you're
11 in no position to indicate to the Inquiry the evidence
12 you are prepared to call and that you are prepared to
13 go first, in connection with this, unless you do that
14 it seems to me we're just pawing the air here.

15 MR. ANTHONY: Well, Mr.
16 Commissioner, putting the question of resources aside
17 and I wish I could, I -- my instructions are at
18 present that we are prepared to address those issues
19 as outlined in the presentation I gave to you, as
20 part of the submission. Now, just as Arctic Gas
21 in its responses to the Pipeline Application Assessment
22 Group has made it clear that until you get down to
23 questions of final design, you are unable to get
24 specifics; and until there is specific proposals
25 you can't get down to specifics. Keeping these
26 issues in mind I think we can address those issues
27 that I have outlined to you. So that while we can, for
28 example, discuss questions of general location because
29 of scarcity of granular material or water that might
30 be required, or whatever the case may be, we would

1 be in no position to either lead evidence or give
2 perhaps very satisfactory answers in response. As to
3 what are the requirements that you expect an oil
4 pipeline to take and so on, I think we can raise the
5 questions that the current knowledge suggests that
6 these developments are going to go along in this area,
7 and that raises the problem of granular requirements
8 and so on without being able to specify in any detail
9 that we will require so many million cubic feet, and
10 these will require this many million cubic feet, and
11 therefore there's not enough in that area.

12 Similarly, I think we would
13 be prepared to address the question of where alternate
14 routes are being proposed, whether it's be other govern-
15 ments or other transportation systems, by merely saying,
16 "Here's the Mackenzie Valley Pipeline study and this
17 is the most current information that we have on that.
18 Here is the most current information we have about
19 a railway, and so on," to place before the Inquiry these
20 general questions of alternate routes that are being
21 proposed, or may be proposed.

22 Now that may not go to the
23 full extent that would satisfy the applicant or even
24 this Inquiry, and to that extent we are limited; but
25 I guess our argument is that at least to that extent
26 the information should be provided at an early date.

27 Our consideration is really that the question of
28 route selection be considered beyond merely an engineer-
29 ing cost and feasibility issue, and if we can do that,
30 well, whether as part of the Phase 1 evidence, because

1 you have advised us that you feel it would be
2 appropriate to discuss it in a broader context, or
3 whether as part of the corridor evidence which can ~~ten~~
4 be continued at a later stage, if you so desire, I
5 think that that sort of evidence should be forthcoming
6 and we would ^{certainly} be prepared to address ourselves to those
7 issues. As I say, on the basis of the information we
8 had, we expected that information would be in fact part
9 of what we called corridor; but certainly on your
10 direction if you were to say that, "I would like all
11 this information in a general way before us, before
12 we get into the environmental phase, as part of a
13 question of route selection and as part of Phase 1,"
14 I think that would satisfy our requirements, and the
15 issues we feel must be addressed at this early stage.

16 THE COMMISSIONER: Well, thank
17 you.

18 MR. GENEST: Mr. Commissioner,
19 I just wonder, it may be my misapprehension, but, the
20 way I've stated the matter, I don't want to leave the
21 impression that we are continuing^{or} that we do not
22 propose to do any more than we've done in the appli-
23 cation materials. We recognize that we should -- one of
24 the things I'm trying to get our engineers to do is
25 to see if we can be more specific on the effect of
26 routing and so on, and we would like to present that
27 evidence, and we would like to present evidence to
28 show in some respects why it's difficult to make the
29 comparisons or the assessments required. I don't want
30 my friends and the Commission left with the impression

1 that we are just throwing up our hands on the
2 matter. That's certainly not our position. It's
3 a question of timing.

4 THE COMMISSIONER: Well, these
5 guidelines laid down by the Government of Canada make
6 it plain that the first pipeline, that is the gas
7 pipeline, will influence the shape of the transporta-
8 tion corridor system and in moulding the environmental
9 and social future of the north, so anyone who wants
10 to build a gas pipeline must file all this material
11 which the Inquiry must then consider relating to the
12 construction and impact of an oil pipeline, the
13 pre-supposition being that it would follow the same
14 route as the gas pipeline.

15 Well, I am going to think a-
16 bout this and are we to begin again on Monday at 1P.M.?

17 MR.SCOTT: Yes please, Mr.
18 Commissioner, one o'clock on Monday, with the construc-
19 tion panel.

20 THE COMMISSIONER: Good, I
21 just got a flash here about this movie, I think."Do
22 you want to postpone the movie until 6:30 to give
23 people a break? I can show it on Monday if it
24 seems better."

25 Well, I think 6:30, that's
26 when the movie is being shown but that isn't an
27 official Inquiry function, so there's no coffee.

28 (PROCEEDINGS ADJOURNED TO APRIL 21, 1975)
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